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**Narrative Threads: Supporting young people in
developing writing skills through narrative-based
game creation**

Katherine Howland

Thesis Submitted for Degree of Doctor of Philosophy

University of Sussex

June 2012

Declaration

I hereby declare that this thesis has not been and will not be, submitted in whole or in part to another university for the award of any other degree.

Signature:.....

University of Sussex

Thesis submitted by Katherine Howland for the Degree of Doctor of Philosophy

Narrative Threads: Supporting young people in developing writing skills through narrative-based game creation**Summary**

This thesis examines how narrative-based game creation can be used as an activity to improve writing skills for young people aged 11-15, and how additional representational support in a game creation tool can increase the benefits of the activity. Creating narrative-based games can involve traditional writing skills as well as requiring the 21st century skills of multimodal and interactive writing. Toolsets make it possible for young people to create 3D role-playing games with a commercial look and feel, but they do not provide support for the complex task of interactive and multimodal narrative creation.

To investigate the desirable features of a tool that would support this task and the associated learning, an extensive learner-centred design process was conducted. This involved teachers and young people, and also incorporated relevant theory synthesised into a design model. A suite of tools, Narrative Threads, was designed and developed through an iterative process to provide the support highlighted as important. Two evaluative studies were conducted in different learning contexts; a secondary school and a vacation workshop. A mixed-methods approach was used to examine the overall potential for the activity to support writing skills development and the impact made by additional representational support.

Comparative studies between groups showed some evidence that writing skills were improved for those taking part in game creation, and there were further benefits for groups using Narrative Threads in the workshop setting, but not in the school setting. Additionally, a multimodal analysis of the games created showed that many participants demonstrated a developing proficiency in using 3D graphical elements, text and sound to convey an interactive narrative. The findings indicate promise for the approach, although additional curricular and pedagogical support would be crucial if the potential is to be actualised in a classroom context.

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Publications

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1 Introduction

1.1 Background

One of the most important things young people can learn is how to express themselves effectively through writing. There are perpetual concerns about the need to improve school-children's literacy skills (Fisher, Brooks and Lewis 2002; Goodwyn 2002), and whilst some have noted the tendency for research to focus on reading (Daly 2003), many educational researchers are exploring ways to improve the teaching of writing (Myhill 2001; Rose 2009). There is also evidence that improving writing has recently become a key concern for many UK schools (NLT 2011). Lack of motivation in young people for tackling writing tasks (Pajares, Valiante and Cheong 2006), as well as feelings of frustration (Graham, Berninger and Fan 2007) and apprehension (Sharples 1999; Mulholland and Robertson 2001) about writing have all been identified as problems. At the same time, there is a growing recognition that technology is fundamentally changing the way we communicate, with important implications for writing culture and development (Baron 2005; Gundlach 2009). Whilst the written word remains an essential means for communication in both formal and informal contexts, other representational modes (for example, visual and audio) are taking on increasingly important roles alongside text (Kress and Van Leeuwen 2001).

Writing is one form of external representation, albeit a particularly important one. Creating an external representation is a meaning-making activity. It is not just making the marks on the page: the rest of the process, including deciding what knowledge to convey and how to represent it, is also crucial (Bereiter and Scardamalia 1987). Multimodal theory describes how meaning-making increasingly takes place through a variety of representational modes, with important implications for writing (Kress and Bezemer 2009). In order to communicate effectively today, young people need to be able to make use of multiple representational modes. An additional complicating factor is the need to understand and design for interactivity (Haas and Wickman 2009). For these reasons, it is no longer sufficient for educators to teach children how to convey a message through linear text, they also need to know how to make effective use of other modes, such as video, image and audio, and to plan branching pathways through the content they create.

Computer and video games are a particularly prevalent example of the multimodal artefacts which play an important part in our culture, and they have interactivity at their essence. The motivating power of computer games has been discussed exhaustively, but many young people also find computer game *authoring* to be engaging, and the challenging yet appealing nature of the task makes it ideal as a learning activity (Kafai 1995; Good and Robertson 2006b).

Researchers have explored game creation as a method of introducing children to computer science (Overmars 2004; Kelleher, Pausch and Kiesler 2007; Repenning, Webb and Ioannidou), teaching mathematics (Papert 1993; Kafai, Franke, Ching et al. 1998) and developing metacognitive skills (Harel and Papert 1991; Kafai 1995). Building on work which has explored narrative-based game creation (Robertson and Good 2005; Szafron, Carbonaro, Cutumisu et al. 2005; Robertson and Good 2006), this thesis investigates the potential for game creation to support the development of writing skills, with a particular focus on writing in multimodal contexts.

Narrative-based games were chosen as the focus because there is good potential for the use of writing skills in conveying narrative elements. Although some game theorists argue that the relationship between games and narrative is problematic (Adams 1999; Costikyan 2000), it is generally agreed that narrative elements are important to many games (Jenkins 2004; Carr 2005; Dickey 2006).

Creating narrative-based games can involve writing interactive conversations, creating characters, designing settings, structuring a branching plot, and it is notable for being motivating whilst also involving a high level of challenge and hard work (Robertson and Good 2005; Good and Robertson 2006b; Robertson and Good 2006). Creating a narrative-based game is undoubtedly a highly complex task. Meaning-making in the form of creating linear text can be challenging enough for young people, and making effective use of multiple representational modes whilst also planning for player interactivity is only likely to increase the difficulty of the task.

If young people are to engage with the activity successfully it is essential that support is provided, both through the pedagogical structuring of the activity, and also through the software that makes the activity possible. This thesis primarily addresses the latter area through the design, creation and evaluation of software-based representational support for narrative-based game creation. However, it also considers the importance of the broader activity context and explores how factors of setting can be supportive or disruptive to the activity.

1.2 Research Questions

This research explores the potential for young people aged 11-15 to improve their writing skills through narrative-based game creation. The age range was chosen because this is an important period for the maturity of writing ability (Sharples 1999, pp. 13-36), and it is also a time at which writing motivation and self-efficacy can diminish (Pajares, Valiante and Cheong 2006). This thesis particularly focuses on the skills needed to use writing effectively in conjunction with other representational modes to convey narrative elements, and on exploring how

additional representational support in a game creation tool can increase the benefits of the activity. As part of this research, Narrative Threads, a suite of tools intended to support young games designers in practicing these skills, was designed and developed with input from teachers and target users.

Specifically, the thesis addresses the following questions:

- RQ1 Are writing skills demonstrated in the narrative-based games created by young people? If so, which skills are demonstrated, and how is writing used in conjunction with other representational modes?
- RQ2 Does narrative-based game creation lead to any measurable improvement in general writing ability?
- RQ3 What features are desirable in a tool designed to support the use of writing skills in game creation, and improvement of writing skills more broadly?
- RQ4 How is this additional interface support used by young designers over the course of a game creation project? Does the additional support change the way the toolset is used, and is there any motivational cost from the tool?
- RQ5 Are there noticeable differences between the games created with the additional interface support and those created without this support? If so, how do these games differ, and is there a difference in the writing skills demonstrated in the games?
- RQ6 Does the additional representational support in Narrative Threads lead to any greater improvement in writing ability?
- RQ7 How can the broader activity context support game creation? How does it affect the usage of the additional support, the skills demonstrated in the games created, and any improvement in writing ability?

1.3 Theoretical Approach

In investigating learning activities for young people, this research necessarily makes some assumptions about the underlying processes of learning and cognition. The work is grounded in two key areas of theory: constructivist theories of learning and the theory of distributed cognition. The established nature of these theoretical approaches is such that a full discussion and outline is unnecessary, but a brief explanation of the ideas which underpin the research is given here.

Constructivist theories of learning hold that knowledge is constructed by learners based on interactions between their experiences and their existing mental framework. Thus, knowledge

cannot be passively received, or passed from teacher to student. Piaget held that learners construct knowledge through assimilation and accommodation of new experiences into their existing mental structures (Piaget 1962). Vygotsky's social constructivism places emphasis on the way that knowledge is constructed in a social context before being internalised by the individual learner. Teachers and more capable peers are able to scaffold learners creating a 'zone of proximal development' between the level the learner can work at independently and the level at which they can work in collaboration with a more capable partner (Vygotsky 1978).

Papert built on existing constructivist theory, highlighting the pedagogical implications of Piaget's insight that learning is an active rather than passive process in arguing that better learning can be achieved through doing and creating rather than being told. Papert's development of constructivist theory, known as constructionism, also holds that the construction of public artefacts is a particularly fruitful learning activity (Papert 1980; Harel and Papert 1991).

Distributed cognition is a theory developed from Vygotsky's insights about the social nature of knowledge construction, but its focus is more broad than learning, addressing the social aspects of cognition in general (Hutchins 1995). It highlights the extent to which cognitive processes are distributed across people and time, with external knowledge structures such as representations, tools and other artefacts playing a vital role in coordinating these processes in addition to the internal structures belonging to each individual (Hollan, Hutchins and Kirsh 2000). This framework highlights the importance of examining cognition 'in the wild', as it is not something which takes place solely in individuals' heads, but in a cognitive ecosystem which involves other members of a social group, and the surrounding artefacts and environment (Hutchins 1995).

1.4 Methodology

This thesis takes an overall approach in line with design-based research guidelines, and uses a specific learner-centred design methodology to drive the participatory design process of the game creation tool interface. The design methodology is explained further in Chapter 3, and the evaluation study methodology is explained further in Chapter 5.

Design-based research grew out of Brown and Collins' work on 'design experiments' (Brown 1992; Collins 1992). Design-based research highlights the importance of real-world research, and of evaluating educational interventions in the context of real learning environments. It emerged from a concern that laboratory-based experiments could not address the complexity of the environments in which learning actually takes place (Brown, 1992). As more people have begun using and developing approaches of this sort, the terms design-based research or design

research have become more common to reduce confusion over the use of the word ‘experiment’ (Barab and Squire 2004).

Design-based research describes a range of approaches rather than a specific method, but certain key principles are defined, as described in detail by Collins, Joseph and Bielaczyc (2004). First, design research should aim to contribute to and draw from both theory and practice (Collins et al. 2004, p.19). It is not simply a case of refining a design for pragmatic reasons to suit a given situation; there is an expectation that design-based research will engage with theory in a meaningful way.

In contrast to laboratory experiments, which attempt to avoid contaminating effects, design-based research necessarily takes place in messy, naturalistic environments where participants are socially active rather than working in isolation. This means that, unlike in psychological experiments where the researcher aims to identify a set of independent and dependent variables and keep all other elements constant, the focus is not on avoiding these contaminating effects, but on characterising the situation and understanding all relevant variables and their effects. Additionally, whilst in most psychological experiments there are one or two dependent variables, there can be many dependent variables in design-based research, although the researcher may not examine all of them. Furthermore, the formal hypotheses which psychological experiments set out to test do not often appear in design research, where the aim is to examine the various aspects of the design and use quantitative and qualitative methods to characterise the design in use (Collins et al. 2004, p.20-21).

A final key element of design-based research is the variation from the roles of experimenter and subject which underlies most laboratory based experiments. In design research there is a drive to involve participants in the design stage, and sometimes even in analysis of data (Collins et al. 2004, p.21).

In this research, participants were involved extensively during the design stage. A learner-centred design approach was adopted to drive the design of the tool. The specific framework followed was CARSS (Good and Robertson 2006a; Robertson, Good, Howland et al. 2012). The CARSS framework was chosen because it has been used successfully in a number of other learner-centred design projects with child users. This includes the Adventure Author and Flip projects described below (Sub-section 1.6), as well as being used in the design of technology for children with autism spectrum conditions (Menzies, Waller and Pain 2011; Frauenberger, Good, Alcorn et al. 2012), a mobile location-aware exergame for adolescents (Macvean and Robertson 2012) and a tool to support the learning of movement graphs for pre-university students (Wood and Romero 2010).

CARSS offers guidance on five key aspects of participatory design of technology enhanced learning with children: Context, Activities, Roles, Stakeholders and Skills. *Context* focuses on the surrounding environment in which design activities take place and the inherent constraints, including timetable, curriculum and ethical constraints. *Activities* covers the tasks comprising the standard educational software design cycle, including requirements gathering, design and evaluation of prototypes with a particular focus on the input that children can make. *Roles* describes the functions that a design team member can fulfill within the team, such as subject matter experts, technology specialists and design partners. *Stakeholders* refers to all of those with a key interest in the design process, including teachers and parents. Finally, *skills* describes the attributes and abilities needed by both adult and child design team members and the extent to which these can be developed through training.

1.5 Programme of Work

An initial literature review was carried out in order to explore the relevant theory in areas such as games-based learning, writing development and narrative. A key activity for this thesis was the design and development of Narrative Threads, and its detailed evaluation in two contrasting settings. In 2007 and 2008 a range of design activities were undertaken with teachers and young people to determine the main features of the support software. Much of 2009 was spent implementing the suite of tools which constitutes Narrative Threads. The tools were evaluated early in 2010 in a local secondary school, and later the same year they were evaluated in the very different setting of a game-creation workshop, based at the University of Sussex. Throughout the design activities and the two evaluations, the higher level question of the potential for development of writing skills through the activity of game creation was also explored.

1.6 Related Projects

Throughout this thesis, references are made to two related projects: Flip and Adventure Author. Here, a brief outline of the two projects is given, along with an explanation of my involvement in them, to make clear the distinction between the research carried out in these projects and the research which forms the focus of this thesis.

The Flip project, funded by the Engineering and Physical Sciences Research Council (EPSRC) and based at the University of Sussex, involved the design and creation of a bi-modal (visual and textual) programming language for use in game creation (Howland, Good and Nicholson 2009; Nicholson, Good and Howland 2009; Good, Howland and Nicholson 2010; Good 2011; Good and Howland 2012). The language, Flip, was designed to support young people in developing computational skills and understanding, through scripting behaviours for characters and objects in their own computer games. I worked part-time as a Research Fellow on the Flip

project for 2.5 years whilst also working on my DPhil research. Some of the design and evaluative studies described in this thesis were organised jointly in conjunction with the Flip project, as is explained when the studies are described in Chapter 3 and Chapter 5.

The Adventure Author (AA) project, funded by the EPSRC and based at Heriot-Watt University, examined the creative process of computer game design (Robertson and Nicholson 2007; Robertson and Howells 2008; Robertson 2011; Robertson 2012). The project involved the design and implementation of tools to support the creative process, such as ideas generation, peer review, conversation writing and task management. I contributed to the design of the conversation writer tool, and also received useful input from the AA team about certain aspects of the design of Narrative Threads, as discussed in Chapter 3. Some of the design studies were also carried out in the context of workshops and school projects organised by the Adventure Author project team, as explained further in Chapter 3.

1.7 Outline of Thesis

Chapter 2: Games, Learning & Writing

This chapter gives an overview of relevant literature and reports on related work. It first examines why computer games are of such great interest to educational researchers, and gives an introduction to work on game creation and its potential as a learning activity, including research which has examined narrative-based game creation. Policy and research about writing in the 21st century is presented next, with a specific focus on writing development in secondary schools. Debate around the extent to which computer and video games embody narratives is then addressed, followed by an overview of some key relevant theory on narrative and games. Next, a review of existing game creation software is given, along with discussion about its suitability for narrative-based game creation by young people. Finally, work on the importance of external representations in educational software is presented and discussed.

Chapter 3: Designing Support for Narrative-Based Game Creation

This chapter describes the iterative design process of tools to support the development of writing skills, and also explores the significance of support from the broader activity context. An initial consultation, carried out with teachers and pupils in order to explore the potential for the activity and examine the support required, is presented and the findings discussed. Following this, four design study settings are described, including an overview of the important elements of context in each case. Subsequently some high-level design decisions about the required categories of software support are explained, with reference to relevant theory and the consultation findings. Finally, the targeted participatory design activities are described, with close reference to the design decisions made and the iterative designs of specific support tools.

Chapter 4: Narrative Threads: Implementation & System Description

This chapter gives a high-level overview of the technical implementation of the system designed in the previous chapter. There then follows a more detailed system description with a full account of functionality for each of the tools. Throughout the system description, reference is made to the findings from the design process which led to the resulting decisions and associated functionality and behaviour of the tools.

Chapter 5: Evaluative Field Studies

This chapter introduces two naturalistic field studies, designed to address the key research questions and evaluate Narrative Threads. The design and methodology for the two studies, which were carried out in different real-world game creation contexts, is outlined with reference to the research questions. The two different study contexts are then described, and key findings are presented with reference to observations, pre and post writing skill levels, system logs and user feedback given in questionnaires and interviews. A discussion offers some initial answers to the research questions based on the presented findings.

Chapter 6: Analysis of Games

The games created during the evaluative field studies are analysed in detail in this chapter. First, a marking schema which was developed for assessing narrative-based games is presented, followed by the resulting game ratings as marked by teachers with experience of teaching game creation. Next, a multimodal analysis of a subset of the games is described. An outline of the multimodal analysis approach used is given, and the resulting analysis is then presented, with a focus on the narrative elements included within the games, the levels of success participants had in conveying their meanings and the range of modes used to communicate with the player. The chapter ends with a discussion of the research questions and offers some initial answers based on the findings presented in the chapter.

Chapter 7: Conclusions & Further Work

In the final chapter the research questions are revisited and conclusions are drawn, considering the findings across the thesis chapters. The key contributions of the work are summarised, and future work to further examine, extend and strengthen these conclusions is suggested.

2 Games, Learning and Writing

This chapter reviews the literature on game-based learning and writing development. The background of games-based learning is examined first, including the elements of games which make them appealing to educators, and the barriers to the adoption of games-based learning in classrooms. Work specifically focusing on game creation as a learning activity is then addressed, including research which has explored the storytelling potential of game creation. Policy and research about writing in the 21st century is presented next, with a specific focus on writing development in secondary schools. Multimodality and non-linearity, two factors which have had a considerable impact on writing, are explored in detail. Debate around the extent to which computer and video games, key examples of multimodal and non-linear texts, embody narratives, is addressed next. Following this, a review of existing game creation software is given, along with discussion about its suitability for creative writing tasks. Finally, work relevant to the design of representational support for narrative-based game creation is presented and discussed.

2.1 Learning Through Game-Play and Game-Creation

In order to explore whether game creation is a promising activity for learning within a classroom setting, I first explore the aspects of games-based learning which make it appealing for educators, followed by the challenges of making the activity work in a classroom setting. Finally, I examine the extent to which game creation embodies the same benefits and challenges as game play.

2.1.1 The draw of games for learning

Computer games have long been of interest to educational researchers thanks to their ability to motivate young people to put in levels of time and effort rarely seen in their school work. Educators have been attempting to harness the motivating power of video and computer games to support learning for many years (for a summary of some of the earliest work, see (Cullingford, Mawdesley and Davies 1979)), and there have been many publications on the topic. Here, space permits only an overview of some key examples.

In work which addresses games and engagement, the concepts of fun, play and flow have been very important. In his work on fun and intrinsic motivation, Malone investigated the features of computer games which make them so engaging for many people and explored how these features can be used to support learning (Malone 1981a; Malone 1981b). Intrinsic motivation comes when an activity is inherently interesting or enjoyable (as opposed to extrinsic

motivation, where the rewards are external to an activity) and is widely believed to be important for learning (Lepper and Hodell 1989; Ryan and Deci 2000). Malone and Lepper identify *challenge*, *curiosity*, *fantasy* and *control* as characteristics which are key to intrinsic motivation, and which the most engaging games embody (Lepper and Malone 1987; Malone and Lepper 1987).

Fun and the closely related concept of play can be controversial elements in relation to education. As Rieber (1996) discusses in his work on play in microworlds, simulations and games, opinions on the value of play in relation to education change according to the prevailing educational policy, and the underlying learning theory (p.46). Where the prevailing theory views learning as fact absorption, play will be viewed at best as a carrot, but it takes on greater importance in learning theories which hold that knowledge is constructed by the learner (Piaget 1962; Vygotsky 1978; Bruner 1979).

In Piaget's constructivist theory of learning, play holds an important role with regard to *assimilation*, through which children attempt to make the world they encounter match their own concepts. However, when it comes to *accommodation*, the adaptive process by which children adjust their existing concepts, Piaget sees play as less powerful because in most play situations accommodation is subordinated to assimilation (Piaget 1962, p.32-34). Vygotsky's development of constructivist theory sees play assuming a more significant role, with the power to bring about cognitive development and facilitate the 'zone of proximal development' through which a child can most effectively advance their learning with the help of a teacher or more able peer (Vygotsky 1978).

Many have been quick to point out that play does not mean "easy", and successful games are frequently described as 'hard fun' following Papert's famous usage of the phrase (Papert 2002; Lazzaro 2004). It has been argued that learning is an essential part of both fun (Koster 2004) and play (Singer, Golinkoff and Hirsh-Pasek 2006), and that these concepts are closely related because they all involve aspects of creativity, challenge and concentration. Certainly games are often very challenging, and young people can become quite absorbed in solving problems within them. Many researchers (e.g. Bowman (1982); Rieber (1996); Hsu and Lu (2004)) have discussed the extent to which playing games can bring about a state similar to Csikszentmihalyi's 'flow' experience (Csikszentmihalyi 1991), an optimal state of intrinsic motivation which is thought to increase engagement in learning activities (Shernoff, Csikszentmihalyi, Shneider et al. 2003). Flow describes a state of intense concentration or absorption in a task, where material concerns such as hunger or the passage of time can become insignificant. Crucially, achievement of a flow state requires a delicate balance between the challenge level of the task, and the skills level of the person working on it. Csikszentmihalyi

also wrote about the importance of play in earlier work, noting that it allows people to try out behaviour in an environment in which the consequences need not be feared (Csikszentmihalyi 1981), an idea which is discussed further in relation to using games in school in Section 2.1.2.

The motivating characteristics of game have also been appealing in other application areas, and the study of ‘serious’ games has increased with people attempting to use games to support healthcare, citizenship and a range of other areas (Zyda 2005). There has also recently been increasing interest in using ‘gamification’, i.e. taking real-world tasks and implanting game elements such as scoring and virtual rewards, to make other activities fun. McGonigal (2011) has recently written at length about the essential traits of games which could be used to improve people’s enjoyment of a range of everyday tasks. She argues that, although games have often been used as a way of escaping reality, their characteristics could help to make real-world activities more motivating, in areas including learning, attitude change, healthcare and social interaction. She highlights the importance of having a goal, rules, a feedback system, and of the activity being voluntary. This final trait – the voluntary nature of game participation – is one which is of particular relevance to the use of games within school and it is discussed further in Sub-section 2.1.2).

Others have argued that, aside from the question of whether games can be used for educational purposes, computer games can teach us about learning. Papert (1998) and Gee (2003) have both suggested that educators could learn from computer game designers. Game designers are experts at helping players learn how to play a game, as their success in this is closely tied to the success of the game. As a result, they have developed methods through which young people can learn complex information quickly; their livelihoods depend on it. Games are designed, Papert argues, so that the learner takes charge of the process of learning, and this makes for more productive learning than a situation where control lies with a teacher or a tutoring system. Papert claims that computer games designed for entertainment purposes can help teach the most important skill a child can have today; the skill of directing their own learning.

Gee outlines 36 learning principles espoused by good video games, including encouragement of active, critical learning, amplifying learner input to give greater output and providing simplified subsets of real domains for learning to take place in. Gee also highlights the way in which good video games lower the consequences of failure, and thus encourage risk taking Gee (2003), this can be very beneficial for learning, but can also be hard to engender in school settings as discussed in the following section.

There has been an attempt to take seriously and explore the idea that educators can learn from games. ‘Quest to learn’, as described by McGonigal (2011), is a school set up based on the

principles of game design (Salen, Torres, Rufo-Tepper et al. 2008), although it has not been in existence long enough for its effectiveness to be determined.

There are many characteristics of games which make them appealing to educators, and it is easy to understand why educators are interested in trying to bring about the engaged and enjoyable learning which games designers are skilled at supporting. However, there are a number of challenges involved in trying to integrate games into existing educational systems.

2.1.2 Games in the classroom

There have been a number of reports produced on the educational potential of games in the classroom (e.g. McFarlane, Sparrowhawk and Heald 2002; Groff, Howells and Cranmer 2010). In general, it is accepted that games can be engaging, and that they can embody good principles for learning. However, when it comes to the question of what is being learnt, things become less clear. McFarlane and Sparrowhawk et al. (2002) found that teachers generally accept that a broad range of general skills can be learnt through playing games, but are sceptical when it comes to the potential for learning subject-related content. Furthermore, it is not just teachers who are unsure what can be learnt, pupils themselves can be doubtful about what they can learn through game play (Squire 2005, p. 26).

In fact, there is no shortage of games designed with the teaching of curriculum-related content in mind, but they have not had great success (Kirriemuir and McFarlane 2004). Often referred to as ‘edutainment’ software, there are many games which attempt to make learning fun by embedding educational content within games. However, it has been argued that many examples of edutainment manage to lose the best features from games and encompass the worst features of curriculum-based learning (Papert 1998).

Bruckman highlighted the tendency of such games to lose the fun element by taking a “chocolate-covered broccoli” approach where players are rewarded for doing something perceived to be unpleasant (Bruckman 1999). These games are based on the assumption that knowledge can be implanted through drill and practice or repetition of certain exercises, and that this repetition can fruitfully be encouraged through unrelated rewards. Bruckman illustrates her point through the example of a maths game in which children are presented with a set of basic arithmetic questions, with each one correctly answered earning them a bullet. At the end of each round of repetitive questions the child is able to play a brief shooting game with the bullets they have earned. Bruckman points out that such software works against the idea that learning can be intrinsically fun and rewarding; the message is that it is something to be endured before the fun can start. Essentially, such games have been designed by people who do not believe that we can learn through play. This approach is clearly at odds with the idea that intrinsic motivation is important to learning, and with constructivist approaches to learning.

This model is more in line with behaviourist theories which hold that learning is the acquisition of new behaviour through conditioning, and can be supported through external rewards and punishments (Skinner 1974).

The heyday of behaviourism was in the first half of the 20th century, and psychological studies have repeatedly found that external rewards can potentially undermine intrinsic motivation (Deci 1971; Tang and Hall 1995). However, despite this, and despite reports which have found that games based on such approaches are largely unsuccessful (Kirriemuir and McFarlane 2004; Mitchell and Savill-Smith 2004), games of this sort are still widely available and used in schools. This may be because, as Squire (2003) points out, games that embed curriculum-based content into familiar game structures can be easy for teachers to integrate into existing educational structures. Troublingly, the current UK Education Secretary recently heaped praise on a game remarkably similar to Bruckman's example of a "chocolate-covered broccoli" game, where arithmetic questions must be answered to allow children to fire a gun at enemies (Stuart 2011).

For many key thinkers in games-based learning, the whole approach of trying to design games which teach curriculum content is wrong, and concern about content is seen as symptomatic of an education system which is not keeping up with developments in learning theory or technology. Gee has illustrated the range of hugely important skills which can be developed through playing video games, and addresses what he call "the problem of content" head on (Gee 2003, p.19). He argues that people who think games are a waste of time for young people because they do not contain useful content believe education to be all about fact transmission, in line with outmoded theories of learning. Gee argues that "[s]chool is often built around the 'content fetish'" and maintains that what is more important is learning to take an active part in a discipline, essentially taking on a role as one does in a game (Gee 2005).

This argument about the importance of roles is convincing, but does not eliminate teachers' concerns entirely. Rather, it suggests that the problem should be thought of less as a lack curriculum content in games, and more as a shortage of game roles for young people to take on which will be useful to them in life. Whilst young people can learn crucial general learning and metacognitive skills through playing games, there is also potential for game to help pupils learn more transferable skills that relate to school subjects and potential careers.

Whilst Papert (1998) and Gee (2003) both make a strong case for the need for schools to change to keep up with developments in technology and the associated social changes, this is not something which will happen overnight. Making use of games to support the teaching of current school subjects has potential to increase teachers' and policy makers' understanding of the way that games can bring about powerful learning. Showing how games can support existing

curriculum foci could allow room for discussion of other key skills and competencies which can be developed through games but are not currently taught in schools. Additionally, it is important for educational researchers to work with schools, because this is the only way they can get access to a broad cross section of young people. Some of the pupils who could benefit the most from new approaches to learning are unlikely to attend voluntary out of school workshops and may not have access to computers and games consoles at home.

Squire argues that educators often do not make good use of media that does not fit the social organisation of formal schooling (Squire 2005), citing work by Cuban on the history of classroom usage of technology (Cuban 1986) which highlighted the extent to which educators try to fit new technologies with past practices and are put off using new technologies which cannot be made to fit. This suggests that researchers have a responsibility to consider how games can be integrated with formal education and training, if the potential for learning through games is to be actualised. Although, it is also important not to let concerns about fitting in with past practices prevent innovation.

There is increasing evidence that games can support formal learning successfully without primarily being designed for the purpose. Brain training games are an obvious example of commercial games designed for entertainment which can have measurable learning outcomes, although the transference of learning to other situations is less clear (Bottino, Ferlino, Ott et al. 2007; Miller and Robertson 2010). America's Army, a game originally conceived of as a recruitment tool for the American Army is now being used to train soldiers (Jean 2006). Furthermore Squire had some success using the game Civilization III to support the learning of world history (Squire 2005), finding that, although it was no silver bullet, the game was a powerful way of introducing students to a range of relevant concepts, as well as allowing them to gain a better understanding of how different periods of history are connected (Squire and Jenkins 2003).

Commercial games sink or swim according to their ability to keep players motivated and ensure good learning, as highlighted by Papert (1998) and Gee (2003). A key challenge for many games-based learning researchers is to design games which can be integrated within curriculums without losing these crucial characteristics. An important starting place will be to examine the key principles and characteristics of successful commercial games (Squire, Jenkins, Holland et al. 2003).

There are a growing number of examples of games that have been designed for educational purposes, and which are not based on outmoded theories of learning, and encouragingly these are increasing. Bruckman highlights some early examples of games which are more constructivist in their approaches, such as *My Make Believe Castle* and *The Incredible Machine*

(Bruckman 1999, p.76). These allow learners to take a more exploratory approach to problem solving and learning, and do not rely on extrinsic motivation; the learning is an integral part of the enjoyable and fun game play.

Supporting intrinsic motivation is an important consideration for games for learning, which was first discussed in the early 1980s and continues to factor in educational game design today. Malone held that the key to supporting intrinsic motivation in games is ensuring that the *fantasy* elements of a game are intrinsically connected to the skills used in the game, for example in a darts game where the player is required to estimate distances in order to participate in the fantasy of bursting balloons with darts. Malone gives the example of ‘Hangman’ to illustrate extrinsic fantasy; the skill of guessing words is not related to the fantasy of an impending execution (Malone 1981b). The game in which a player must answer unrelated arithmetic equations in order to shoot a gun is another clear example of extrinsic fantasy.

Rieber also highlighted this distinction by categorising games as either embodying exogenous or endogenous fantasy, and argued that in endogenous fantasy games a learner will automatically be interested in the learning content if they are interested in the game (Rieber 1996). More recent work has argued that integration of fantasy may not be the most important aspect, and has claimed that ensuring that learning content is integrated with the *core game mechanics* may be of more significance (Habgood, Ainsworth and Benford 2005). *Zombie Division*, a game which implements ‘intrinsic integration’ in this way, requires the player to use different attacks depending on the numbers displayed on zombies’ chests. Attacks are assigned numerical values according to the weapon used, e.g. dividing by two is a single sword swipe, whilst dividing by 3 involves barging the enemy with a triangular shield. A study found that this ‘intrinsic’ version of the game supports greater learning than with a version which had non-mathematical combat and included maths questions between levels. Additionally, children spent much longer playing the intrinsic version when given free-time (Habgood and Ainsworth 2011). Habgood argues that the fantasy context of the game could be easily be replaced without losing the crucial integration between game mechanics and learning content.

Squire mapped out the different underlying game aspects which Rieber’s terms imply and highlighted the benefits of endogenous games, focusing on the integration of game play with *context*, which can be interpreted more broadly than fantasy. He argues that endogenous games involve problem-solving and experimenting as well as collective play, and encourage learners to bring their existing identities and previous knowledge and leverage these within the game (Squire 2006). Recently, promising research has documented the design of an endogenous game which embodies these positive characteristics, and successfully integrates important curriculum content (Gaydos and Squire 2012). Gaydos and Squire describe an educational game, *Citizen*

Science, which aims to help learners develop identities as citizen scientists. It is designed to support learning within the domain of lake ecology and built with reference to conventions from commercial games. The result is an authentic game where the activities are well integrated with the desired learning (Gaydos and Squire 2012, p. 1). Two studies provided evidence for the promise of such an approach, with learning gains shown in a post-interview. Games literacy was an issue which influenced outcomes; students with little experience with games had difficulty using the inbuilt game model and interpreting the game's narrative. However, more experience did not necessarily lead to a better experience with the game, as some users reported that the game fell short of their experiences with commercial games, indicating a tension raised by their experiences with games outside of school. The work highlighted the benefits of integrating game experiences with other learning experiences such as a field trip, as well as the broader importance of the overall curriculum into which the game-based learning is integrated (Gaydos and Squire 2012, p. 22).

It is clear that it is possible for games to be designed which integrate curriculum content without losing key positive aspects of the games. However, over and above the curriculum question, further challenges must be overcome to achieve successful use of game play for learning in schools. A number of game characteristics that contribute to the motivating power of games are potentially at risk simply through the games being used in schools, even if the games themselves are well-designed. Key amongst these are the voluntary nature of games and the low consequence of failure in games.

Many theorists suggest that the voluntary nature of games is essential to the definition of a game (as discussed in reviews of game definitions (such as Juul 2003; Salen and Zimmerman 2004), and it is clear that when implanted into school as a compulsory activity, this aspect will be jeopardised. Squire's studies into using games in a classroom environment indicated that "some students (including gamers) rejected the game experience in school... because playing *Civilization III* in a school context was *compulsory*" (Squire 2005, p. 28).

As Csikszentmihalyi (1981) noted, games are notable for their support of risk taking, as the consequences of failure are unlikely to be permanent and rarely impact on a person's everyday life. Gee argues that the way game creation supports risk-taking is one of the aspects educators can learn from, but this is a very challenging characteristic to emulate. The consequences of failure within a game are not just low because the player can save at regular intervals, there is also the fact that the consequences of failure are low, full-stop. They do not need to worry about getting told off by their parents for failing to excel at a video game, and it is unlikely that there will be any consequence on their future career prospects. School on the other hand, is necessarily a higher risk environment. Pupils can see failure at school as a value judgment on

themselves, even when they self-identify as gamers and so are likely to have encountered and overcome failure with games in an out of school environment (Squire 2005).

Clear problems remain with integrating game play into the classroom, in spite of some success stories. However, a different approach in looking at the activity of game creation, as opposed to game playing, can have many of the same benefits and avoids some of the drawbacks. As discussed in the following section, it can be motivating, and construction is a good learning activity which can also be fun. It is in line with constructionist theories of learning, and is likely to be the sort of activity which can bring about a flow state. Children and teachers are more likely to see the clear potential for skills development through an activity which is purposeful and involves building something and developing skills which have a clear translation to a real life job. Furthermore, the issue of implanting curriculum based content does not occur with game creation; there are a number of subject areas where there is inbuilt potential for authentic skills development through the activity.

2.1.3 Game creation: learning through construction

Game play is only half the story with game-based learning, and many researchers have begun to look at game creation as a beneficial activity for young people (Kafai, Franke, Ching et al. 1998; Robertson and Good 2004; Pelletier and Burn 2005; Maloney, Kafai, Resnick et al. 2008a). Kafai, who was one of the first to investigate this approach, notes that game creation allows young people to move from being mere consumers of digital culture to being creators (Kafai 1995). Computer game creation can be a very motivating activity, especially for boys, and, much like game play, it is notable for being motivating whilst also involving a high level of challenge and hard work (Good and Robertson 2006).

Building games is an authentic, constructivist task, in which young people can take on a meaningful role. Constructivism argues that knowledge is not simply passed from teacher to student, as it cannot be passively received but must be constructed by the learner through assimilation and accommodation into their existing mental structures. Papert built on Piaget's work, pointing out that Piaget's insights that learning is an active rather than passive process indicate that people should learn better by doing and creating rather than being told, and that the construction of public artefacts is a particularly fruitful learning activity. This led to his development of Piaget's theory into constructionism (Papert 1980; Harel and Papert 1991).

Papert holds that the learning skills which children develop whilst playing computer games can be enhanced by encouraging them to take on the role of game designer, a role which leads to more sophisticated thinking about all aspects of games (Papert 1998). As a designer, a young learner must construct a game for an imagined player, requiring practice of some fairly advanced metacognitive skills. Kafai investigated the educational potential of game-making

through a study in which children designed and programmed educational games for younger children (Kafai 1995). It is only more recently that software has existed which allows the creation of games without the need for programming skills, with recent developments making it possible for children to create games in a virtual environment of commercial quality.

Researchers have explored game creation as a method of introducing children to computing concepts (Overmars 2004; Habgood 2005; Kelleher, Pausch and Kiesler 2007; Korte, Anderson, Pain et al. 2007; Maloney et al. 2008a; Carbonaro, Szafron, Cutumisu et al. 2010; Repenning, Webb and Ioannidou), teaching mathematics skills (Papert 1993; Kafai et al. 1998; Habgood and Ainsworth 2011), and encouraging learners to develop higher level thinking and metacognitive skills (Harel and Papert 1991; Kafai 1995; Robertson and Howells 2008). The research described in this thesis is motivated by work which suggests that game creation has the potential to support storytelling

There have been a number of studies conducted into the use of a computer game authoring tool to help develop narrative and storytelling skills in children of secondary-school age (Robertson 2004; Robertson and Good 2005a; Good and Robertson 2006; Burn 2007; Carbonaro, Cutumisu, Duff et al. 2008). These investigations have used game creation tools which are revolutionary in allowing children to create 3D games without the need for programming or 3D design skills. The outcomes have indicated that it is possible for children to create games with good narratives, interesting characters, compelling plotlines and literary themes using these tools. This indicates that computer game creation is an activity which can support the development of traditional writing skills, as well as the development of skills in a new form of digital literacy.

Robertson and Good have been investigating the potential for game creation to support interactive storytelling, among other learning activities, for a number of years (see for example (Good and Robertson 2003; Robertson and Good 2004; Robertson and Good 2005b; Good and Robertson 2006). They have carried out an extensive series of studies using a game creation toolset distributed with *Neverwinter Nights* (NWN) (Bioware 2002), a 3D role-playing game. This tool was chosen because it allows young people without specialist technical skills to create games with commercial quality 3D graphics. Children can use the toolset's Graphical User Interface (GUI) to quickly create areas, objects and characters by dragging and dropping GUI elements. Wizards and menus allow the user to set up events to take place within the game, including interactive conversations between the player and a non-player character (NPC). Using these tools, children are able to create simple stories quickly and easily.

Commercial video and computer games are often written by large teams and will customarily employ at least one dedicated writer for the project. Although some games succeed without

particularly compelling narratives, the plot is generally considered to be an integral part of the game which is taken very seriously (Handler Miller 2004; Bateman 2007; Ince 2007). Some believe that games are an important new medium for storytelling (Laurel 1991; Atkins 2003), but it's not necessary to agree with this to recognise that writing skills are involved in creating narrative-based games.

2.2 Writing in the 21st Century

To understand whether game creation has potential as an activity for writing development it is necessary to examine theory in this area. This section begins by exploring policies and research which have impacted on the way writing is taught in the 21st century. These allow an exploration of what writing is, and what kinds of activities are fruitful for developing writing skills. Finally the impact of technological developments on writing is considered.

2.2.1 Educational policy on writing

Improving writing skills has been a key concern for educators over the past decade. General literacy has been a focus at a political level as highlighted by the government's introduction of the primary level National Literacy Strategy (NLS) (DfEE 1998) and subsequent extension to secondary level with the Key Stage 3 National Strategy for English (NS) (DfEE 2001).

Although much attention has been given to improving reading (Daly 2003) there has also been considerable focus on research into improving the teaching of writing (Myhill 2001b; Rose 2009), especially for boys (Graham 2001; Hilton 2001; Myhill 2001a; Bearne 2002; Barrs 2004). Additionally, in their most recent advice to schools on writing, the National Literacy Trust (NLT), note that "[w]riting is the top literacy concern for schools this year - 64% of teachers named it as their priority in our recent survey" (NLT 2011, p.8)

The NLS and KS3 NS focus on the development of writing at sentence, word and text level. They are fairly prescriptive documents and give specific advice on what children should be taught to do, at a very detailed level. The NLS is credited by some with bringing about a significant improvement in standards of literacy (Beard 2002), although the evidence used to justify this claim has been questioned (Wyse 2003). There have been far fewer claims made about the success of the KS3 NS, and it has been argued that there have been few serious attempts to evaluate or critique either document (Goodwyn 2002). In any case, improving writing skills remains a concern.

Although concerns about writing levels focus on the quality of the written text produced, research around writing development highlights the importance of considering the broader process of writing, with the act of text production generally being seen as one part of a larger process of meaning-making. Whilst there is some work which looks at teaching sentence and word-level skills such as spelling and grammar (Locke 2009; Read 2009) the majority of

research into improving writing development focuses on the broader writing process, and it has been argued that government initiatives focusing on sentence-level concerns such as the improvement of grammar (DfEE 2000) are not grounded in empirical evidence (Wyse 2001). Space precludes a review of this body of work, but some key topics are outlined in the following sub-section with examples.

2.2.2 Writing research

On first view, the potential for game creation to support the development of writing skills might be seen as directly related to the amount of text generation which takes place. However, research into writing development indicates that text generation is only a small part of the overall writing process. Flower and Hayes (1981) originally proposed a focus on the cognitive process of writing as problem-solving. Their approach characterised writing as set of a goal-driven thinking processes involving three main elements: “the task environment, the writer's long-term memory, and the writing processes” (Flower and Hayes 1981, p.369). The first of these covers the context of the writing activity, including the purpose of the piece and its intended audience, whilst the second refers to the existing knowledge of the author relating to the content and genre of the piece. The third of these, the writing processes, come under three main categories: planning, translating to written text and viewing. So, although the words on a page (writing as noun) are what are judged, the process of creating them (writing as verb) requires proficiency in a broad range of skills, of which text production is only one stage. Clearly the term ‘writing’ is used in many different ways. Beard (2000) describes three sub-processes involved in producing a piece of writing: composing, writing and reviewing (or re-reading). Here, composing involves planning and drafting, writing involves the physical transcription or secretarial skills, and reviewing involves re-reading and editing. Unsurprisingly, young writers can get confused about what is most important with writing and can focus on secretarial skills and presentational aspects of their writing (Evans 2001; Myhill 2001b, p.6). However, a study of writing processes indicated that those who produced higher quality pieces of persuasive writing had spent more time interpreting and understanding the writing task than others (Van Den Bergh and Rijlaarsdam 2001).

Writing is essentially one form of external representation. Creating an external representation of knowledge is a meaning-making activity. It is not just making the marks on the page; the rest of the process including deciding what knowledge to include and how to represent it is also crucial. Bereiter and Scardamalia's (1987) investigation into the composition process led to a distinction between ‘knowledge telling’ and ‘knowledge transforming’ approaches to writing. Knowledge telling is a model of writing which is content focused, and involves retrieval of information from long-term memory and representation of this in language. This approach does not involve an overall plan but relies upon cues from the writing task to prompt memory

retrieval and text-generation based on the information recalled; this ‘think-say process’ repeats until the writer runs out of ideas or they reach an apparent conclusion. Knowledge transforming, in contrast, is a more complex problem-solving process which involves metacognitive activities. The writer who adopts this approach will make the constraints of the task (including the intended audience and purpose) explicit, and will set goals and sub-goals based on their understanding of the gap between the requirements of the piece and the text produced so far. This latter approach requires much more reflection, which can cause problems for young writers as it requires them to stop what they are doing and return to it later. Children invariably start out using the knowledge telling approach but must develop their approach if they are to move to the knowledge transforming strategy used by more mature writers.

Clearly writing is a very cognitively demanding activity, and many researchers have investigated issues around the limits of working memory. Skilled writers have been shown to have higher working memory capacity than those who produce lower quality writing (McCutchen 1996). Encouraging young writers to talk has been suggested as a way of extending their working memory capacity (Latham 2002). Facilitating talk in the classroom has also been recommended more widely (Myhill and Fisher 2005; Myhill, Jones and Hopper 2005; Parr, Jesson and McNaughton 2009; NLT 2011). Speaking activities have been found to help, not only with developing ideas as part of the meaning-making process, but also with vocabulary development (Johnson 2000), as spoken language effectively forms a ceiling which writing levels are limited by (Latham 2002). Writing frames, which structure writing by providing text prompts for developing writers to add to, are sometimes used with the aim of scaffolding the writing process (Lewis and Goodwin 1999), and more general research on completion approaches has indicated that this approach can reduce cognitive load (van Merriënboer, Schuurman, De Croock et al. 2002). However, others have argued that writing frames can be too restrictive and impose limitations on young people’s writing (Grainger, Goouch and Lambirth 2005).

Myhill (2001b) discusses the importance of recognising the dual activities of creating and crafting in teaching writing. She argues that “[h]elping writers discover what they want to say is, of course, as important as helping them discover how to say it”. As well as being given support to develop skills in expression of thought through language, Myhill explains, young writers also need opportunities to express their own ideas. She found that whilst scaffolding can be beneficial, for example through providing some useful vocabulary for an exercise, developing writers need to feel ownership and authority over their work. Being encouraged to express one’s own ideas is only one part of this though, and the power to express them effectively is equally important.

Sharples' account of writing as creative design (1999) addresses issues such as the relationship between constraint and creativity, reflection, and the heavy load writing places on working memory, by placing external representations at the centre of the process. Within Sharples' model, a writing task starts with a set of constraints, some external (extrinsic to the writing task) and others internal (mental and intrinsic to the writing task) which reflect the context of the task. For example, with a school essay the title or subject is one major constraint, and the resources available, such as a set text, are also key to the context, as well as the physical and social environment in which the paper is to be written. The writer's own knowledge and experience can also form part of the constraints. Constraints are inevitable and necessary, but they can be modified once the writer understands how they operate, and often the author must impose the constraints themselves (although there are some cases such as the school essay example which are already well constrained). Constraints actually allow authors to control the possibilities offered by thought and language. Sharples explains: "There are so many ideas that we might have, and so many possible ways of expressing them, that we have to impose constraint to avoid thinking and writing gibberish. Constraint is not a barrier to creative thinking, but the context within which creativity can occur" (Sharples 1999, p.41).

These constraints form the background to the writing process, and drive the author in selecting words or phrases. Sharples describes how a writer does not have conscious control over the flow of words when generating text, and notes that the act of transforming ideas into words places a heavy load on mental resources; "we think with the writing while we are performing it, but we cannot think about the writing ...until we pause" (Sharples 1999, p.7). This highlights the need for a cycle of engagement and reflection whilst writing, as shown in Figure 2.1.

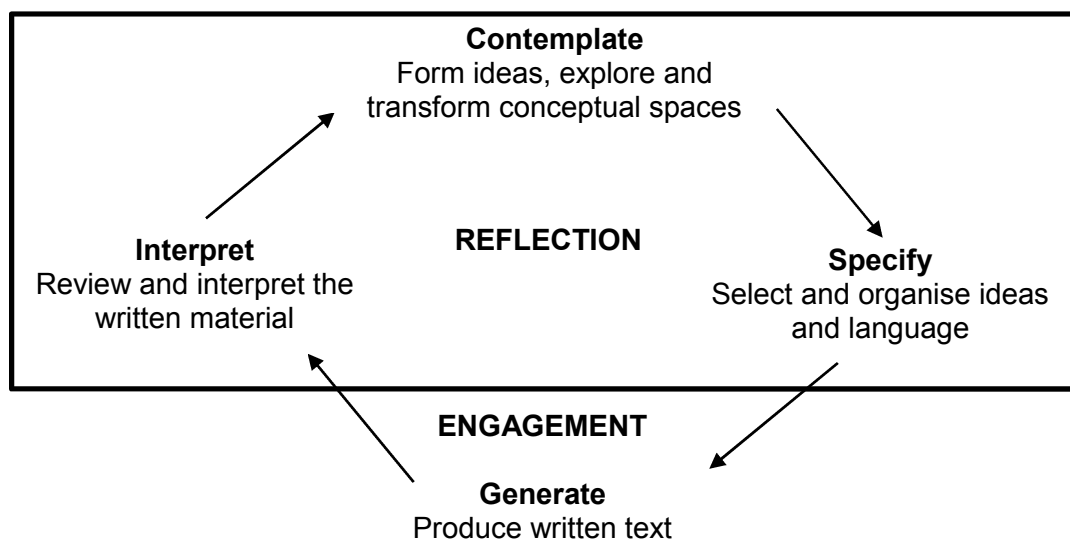


Figure 2.1: The cycle of engagement and reflection in writing
Source: adapted from Sharples 1999

Writers must alternate skilfully between engaged writing and reflection in order to meet the constraints of the writing task. Reflection consists of reviewing the material written so far, coming up with new ideas, deciding what content to add and choosing how to organise it. “A writer generates ideas, creates plans, drafts a text and reviews the work, in a cycle of engagement and reflection” (Sharples 1999, p.8) Sharples explores how children learn to write, and describes how they must move from engaged writing (akin to ‘knowledge telling’) to writing with a balance between engagement and reflection (allowing ‘knowledge transforming’). He also notes that the ages of 10-14 are particularly crucial for children’s writing development (Sharples 1999, p.17).

The barrier of an author’s working memory is addressed in Sharples’ work through the importance of external representations. In order to perform the complex knowledge manipulation necessary to write to constraints, an author must record their ideas externally as they work. The finished piece of writing will of course be an external representation in itself, but ideas, drafts, plans and diagrams are all forms of external representation which the writer can use as part of the process to record ideas in progress and free up valuable working memory resources (Sharples 1999, p.51). The conception of writing as design has gained ground over the years, with prominent writing development theorists conceiving of writers as designers (Maun and Myhill 2005; Myhill 2009), as well as multimodal theorists, as discussed further in Section 2.2.4.

Another key barrier identified in Sharples’ account is lack of motivation for writing, and the related issue of writing apprehension. Writers who rely on extrinsic motivation to drive their work, such as when writing a set essay or for their job, are likely to experience high apprehension at the thought of not being able to meet expectations, and sometimes engage in procrastination to put off the painful task of writing to satisfy demand (Sharples 1999, p.125). Sharples notes that intrinsic motivation can be related to internal enjoyment of the process of writing or internal enjoyment of the product of writing. However, these internal forms of writing motivation are not without their own problems, with the former leading to a lack of focus on the finished product and the latter relying heavily on readers and potentially involving over confidence or fear of failure depending on the individual (Sharples 1999, p.125)

Lack of motivation in young people for tackling writing tasks (Pajares, Valiante and Cheong 2006), as well as feelings of frustration (Graham, Berninger and Fan 2007) and apprehension about writing (Mulholland and Robertson 2001) remain key problems. Investigations into boys’ underachievement found that one of the key factors in boys’ lower attainment was their lack of engagement with literacy (Barrs and Pidgeon 1993; Office for Standards in Education 1993; Younger, Warrington, Gray et al. 2005), with writing singled out as a particular area where boys

lack motivation. However, generalising ability and potential based on gender can be very unhelpful, and a report into boys' underachievement acknowledges that these generalisations can obscure as much as they illuminate (Younger et al. 2005). Additionally, there is evidence that as researchers find out more about the relationship between gender and writing they begin to suspect that these problems are more to do with the way literacy is conceptualised in schools rather than with boys (Daly 2003). Furthermore teachers can sometimes hold stereotyped views of boys as troublesome and girls as compliant (Jones and Myhill 2004), and can make assumptions about children's preferences which are not backed up by the children's own reports (Myhill 2001a).

Gender issues aside, stimulating engagement and motivation to write in all young people remains a key goal. Two key factors in determining motivation have been identified as the writer's sense of competence and their perception of the meaningfulness of the activity (Boscolo 2009). The NLT report that "transforming children's attitudes towards writing and their perceptions of themselves as successful writers leads to significant improvements in skills and attainment..." (NLT 2011, p.8) In their advice to schools they highlight the importance of enjoyment and relevance of writing activities, noting that "[c]hildren who think writing is boring are three times more likely to be below average writers" (NLT 2011, p.8). The artificiality of writing in schools, and the fact that the sole audience for most finished pieces of writing will be the class teacher are issues which have often been raised (Bereiter 2002, p.74).

2.2.3 Writing and technology

Rapid advances in computing technology and multimedia have had a huge influence on reading and writing. There is debate over whether these are causes of problems with literacy or potential solutions (Buckingham 1993; Buckingham 2000; Goodwyn 2002). Some research investigates whether underachievement in reading and writing is due to the distractions of television and video games (Buckingham 1993), whilst others look to ICT to help develop literacy skills (Andrews 2004), especially with regard to motivating boys (McGonigle 1998; Andrews 2004). A third approach to ICT sees many researchers and educators arguing the need for a broader definition of literacy which includes computer literacy, visual literacy and media literacy (Lankshear, Gee, Knobel et al. 1997; Goodwyn 2002).

There is a growing recognition that technology is fundamentally changing the way we communicate, and more specifically researchers have begun investigating "the role of the computer (and computer-based technologies) in reshaping our relationship with both the written and the printed word" (Baron 2005, p.7). To highlight the extent to which being able to read and write alphabetical letters is no longer sufficient for literacy, Papert proposes renaming this skill as 'letteracy' in his work on rethinking education in the age of the computer (Papert 1993). He

believes that outside the narrow definition of literacy “will remain the opportunities, offered for the most part by...new media..., allowing students to become highly literate independent of their progress towards literacy.” (Papert 1993, p. 11).

Of course, many argue that reading and writing of text will continue to be a central vehicle for communication and education for the foreseeable future (Latham 2002). Papert believes that literacy will continue to be important for the next few generations as developments in technology will take time to come about and huge changes like this happen slowly (Papert 1993). There is little sign so far of schools reflecting changes in this direction in their frameworks and curriculums. Certainly the NLS and KS3 NS, as well as the English curriculum for England, are focused on a specific definition of literacy which is concerned with text as the primary mode of reading and writing. It has been noted that the KS3 NS makes scant reference to ICT or multi-media activities, presumably intending that these be dealt with in other areas and leading one researcher to note that “this entirely misses the point that a genuine definition of literacy would have these ‘other’ areas at its heart.” (Goodwyn 2002, p.17). The new Curriculum for Excellence in Scotland, which aims to equip pupils with “the knowledge, skills and attributes needed for life in the 21st century” (Scottish Executive 2004) is an exception in taking a broader definition of text. They note that “[i]n defining literacy for the 21st century we must consider the changing forms of language which our children and young people will experience and use [and take] account of factors such as the speed with which information is shared and the ways it is shared” (Scottish Executive 2004). Their definition of what counts as a text is broad, and includes artefacts such as maps, comics and computer games alongside more familiar candidates such as novels, poems and plays.

The general consensus is that literacy is changing, but most researchers hold writing text to be a core skill which continues to lie at the heart of literacy. One author of a recent handbook on teaching children to write acknowledges the influence of electronic communication on writing but states that “whatever the style of writing or the reason for writing by such rapid electronic means, the communication still depends on the age-old use of the alphabet” (Latham 2002, p.165). Most educational commentators believe that writing in the form of text is still a foundation of writing today, and something which needs to be developed alongside newer forms of communication. However, even those with relatively traditional views about what constitutes writing see ‘secretarial skills’ such as spelling, handwriting and presentation as a means to an end, with communication being identified as the overall aim of composition (Latham 2002).

In a recent book chapter on the future of writing development, Gundlach concludes that there is “[n]o reason to suppose that written language itself will disappear” (Gundlach 2009, p.579), but

also notes that writing is going through a dramatic time of change due to the pervasiveness of technology and the broader context in which written communication now functions.

There has been a fundamental shift in the way that we communicate as a society and it is by no means over. Young people still need to know how to write, but they also need to know how to use writing most effectively in conjunction with other modes of representation. Technological developments have meant that writing is rarely the only representational mode making a contribution for any given communication, and also that it is becoming more common for writing to be non-linear or non-sequential. These characteristics are considered further in the following sections.

2.2.4 Multimodality

In this section, multimodal theory is addressed, and its relation to the future of writing is discussed. Multimodal theory is based on the premise that meaning-making does not take place solely (or even mainly) through language, but through the use of a range of representational modes including image, sound and gesture. The approach has its origins in social semiotic theory (Halliday 1978; Hodge and Kress 1988) which argues that meaning-making is socially situated and language is formed in specific social and cultural contexts. In line with Saussure's original conception of semiotics (Saussure 1983), a sign is any meaningful unit which stands for (or signifies) something else (the signified). Words can be signs, as can images, but they become signs only when we invest meaning in them. The signifier and the signified are both necessary elements of a sign. A text is a complete collection of signs, and is the form which social interaction typically takes. Whilst social semiotics initially focused on the socially situated nature of language (Halliday 1978) social semiotic multimodality broadens this focus to address the other representational modes which are involved in meaning-making, and examines the choices made when people construct texts (Kress and Van Leeuwen 2001).

Kress and Van Leeuwen introduced multimodality in contrast to the monomodality which previously dominated Western culture (Kress and Van Leeuwen 2001, p.1). They describe how language once had a privileged position as "the central and only full means for representation and communication" (p.45). Whilst there were other key modes, these were seen as secondary to and separate from language. Respected publications such as academic articles, novels and official reports would invariably take the form of text with no illustrations. The specialist disciplines of art and music were seen as distinct from other modes of expression, and only professionals within these fields would express themselves using visual or musical modes. "Music was the domain of the composer; photography was the domain of the photographer, etc. Even though a multiplicity of modes of representation were recognised, in each instance representation was treated as monomodal: discrete, bounded, autonomous, with its own

practices, traditions, profession, habits” (Kress and Van Leeuwen 2001, p.45). However, with the advent of multimodality, they describe how “[p]reviously distinct practices, the domains of distinct professions, the clear boundaries [have all] begun to unravel.” (ibid. p.47)

It is important to distinguish mode from medium. A mode is a representational resource for meaning-making, whilst a medium is the production vehicle of the text (Kress and Van Leeuwen 2001, p.21-22). For example, video is a medium, whilst moving image and speech are two of the representational modes used in this medium. Technology has played a big part in the move to multimodality, as there are now tools available to support people in creating a wide range of multimodal texts, making use of modes that would once have required years of specialism to produce. Now when a person wants to communicate or engage in a meaning-making activity they have a choice to make between modes, and they must consider the affordances of different modes, match them appropriately to their purpose, and interweave different modes effectively.

Multimodality is becoming more widely used as a lens for reading texts, with multimodal analysis increasingly used to examine a range of artefacts, from children’s drawings (Mavers 2009) to Ikea tables (Björkvall 2009) and phenomena such as classroom interaction (Bourne and Jewitt 2003) and live footage of September 11 (Chouliaraki 2004). This lens-based approach has been mirrored so far in the English curriculum in schools with attention mostly resting on teaching pupils to ‘read’ multimodal texts. In the current curriculum for England multimodal texts are mentioned with regard to reading, but not in relation to writing (DfE 2007). Even the forward looking Scottish Curriculum for Excellence focuses on the importance of young people reading and responding to a broad range of text type, and place much less emphasis on pupils creating these multimodal texts (Scottish Executive 2004).

With researchers arguing for the importance of multimodal literacy, a natural question is raised: how and when should we teach young people to ‘write’ multimodal texts as well as ‘read’ them? Any attempts to teach young people about creating as well as analysing multimodal artefacts have traditionally taken place within media studies classes. At KS3, children do not typically take media studies classes, so English classes must take on this aspect of meaning-making, and there is currently inclusion of media studies elements at KS 3 & 4. Historically, the focus of media studies has been on films and television programmes, and unsurprisingly this has meant that the most common multimodal creation activity is film/video making. In some cases researchers have explored ‘hypermedia’ creation, but these often involve the creation of artefacts such as PowerPoint presentations or websites (Liu 2003). However, this is beginning to change with some educators now looking at game creation (Burn 2007; Burn 2009) and

exploring what literacy skills young people can develop through creating them (Burn and Parker 2003; Jewitt 2006).

Film-making, creating animations and related undertakings tend not to be considered as core English activities, and as a result media studies is often compartmentalised as related to, but separate from, English. The teaching of writing and reading has so far remained focused on text, but as we have seen, there is growing evidence from research that the notion of writing is changing, and that we need to consider it in conjunction with other modes. Recently there has been work specifically examining what the changing nature of communication means for writing (Kress and Bezemer 2009). Kress and Bezemer agree that it is not that writing has ceased to be important, but the meaning of writing is changing. “The term ‘writing’ no longer stands as a synonym for text or text-making...instead, it refers either to the *mode* of writing or the *practices/ processes* of writing.” (ibid. p.168). Although multimodal theory moves writing from its previous privileged position as the main mode of communication, writing still has an important part to play as a key mode which is often central to meaning-making (Kress and Bezemer 2009).

Kress and Bezemer examine writing in the 21st century and conclude that there are multiple modes in play in every representation, and the modes often interact with one another. The social semiotic theory, which the theory of multimodality extends, holds that people making or interpreting representations are sign-makers, and that the interest of the sign-maker is relevant. As Kress and Bezemer point out, the changing nature of communication means that a previous focus on composition must move towards a model in which people need a wide range of skills to design a multimodal text: “Where before *competence* in relation to one mode, *writing*, was seen as sufficient for the task of *composition*, we now need to understand the semiotic potentials of all modes involved in the *design* and making of multimodal texts” (ibid. p. 170, original emphasis). Modes have different potentials and constraints for meaning-making, or different affordances. What counts as a mode is treated as a matter for decision by the individual communities in which they are used.

Kress and Bezemer initially focus on the multimodal texts created by experts, but also open up discussion of the future of writing, exploring the implications for pedagogy of writing. They note that “...a pedagogy of writing has to be seen as an integral part of a framing pedagogy of communication, in which *writing* has a specific place.” (ibid. p. 180) The focus is on a broader model of meaning-making which reading and writing educators must embrace. “*Pedagogically*, the agency and the centrality of writers and of readers, of those who make meanings, has to be the starting point. *Semiotically*, *writing* has to be seen at all times as part of *multimodal design* arising from a specific *rhetorical interest*. ” (ibid. p. 180)

Kress argues that society has moved from a position where individuals develop competence in one specific practice related closely with a single mode (such as writing) to a situation where people need to develop a broader understanding of the use of a range of modes in order to design multimodal texts. “[C]omposition seen as competent performance is replaced by *design* seen as the attempt to make constantly varying rhetorical purposes effective.” (ibid. p. 171, original emphasis)

Whereas competence in one mode (writing) was previously seen as sufficient for communication, this is no longer the case. To communicate effectively it is now important to be able to use a number of modes in conjunction with one another. This may have implications for curriculum approaches, as school subjects are currently set up so skills relating to different modes are often taught separately. There is clearly a potential divergence between children’s everyday experiences of writing and the current writing curriculum.

Computer game creation is an activity which is cross-curricular and requires multimodal design skills. It is fast gaining popularity as an activity in the Scottish Curriculum for Excellence (Scottish Executive 2004), and educational researchers have investigated its benefits and the multimodal creation skills which can be developed through the activity (Jewitt 2006; Burn 2009). As well as being key examples of multimodal texts, computer games also have another key characteristic; they are non-linear and the narratives within them are non-sequential.

2.2.5 Non-linear writing

In addition to the growing importance of other representational modes in communication, another key change to the context of writing has taken place; whereas once text was generally linear, it is now often read non-sequentially and involves reader choice. In many cases non-sequential texts are often multimodal, but the two are by no means synonymous. In this subsection a brief outline of non-sequential writing is given, along with a survey of work which looks at issues around creating non-sequential texts.

Non-linear texts are most commonly digital, and their prevalence now is certainly due to the technology revolution, but paper based examples of non-linear texts do exist. Books are not always read in order, particularly text books, reference books and anthologies, and there are also books designed specifically to be non-linear such as *Choose Your Own Adventure* books (New York: Batham Books 1960-present) and Ted Nelson’s *Literary Machines* (Nelson 1981).

Digital embodiments of non-sequential texts are far more ubiquitous, however. Hypertext documents are augmented with references or hyperlinks which take the reader to other parts of the document or another document entirely. These terms were defined by Nelson (Nelson 1981) following ideas from much earlier work by Bush (1945). Today, the World Wide Web is by far

the most well-known and widely used example of a hypertext system (Berners-Lee and Fischetti 2000). Websites can be read in many different orders by the reader thanks to hyperlinks, and links to other sites effectively means that the web functions as an gargantuan multi-author non-linear text. Website designers and copywriters must take account of these factors when authoring content, making it a task with quite different considerations to authoring a linear text.

There has been some research carried out on the benefits of hypertext creation activities for young people, and the ways in which hypertext is changing the nature of writing. A recent review of work on hypertext and writing reveals a complex relationship between the two, with a number of issues arising from the interactive and non-linear character of hypertext documents (Haas and Wickman 2009). Bromme and Stahl (2005) argue that creating hypertexts can promote knowledge acquisition, as designing a hypertext article requires reflection on the subject matter. Working from Bereiter and Scardamalia's knowledge-transforming model (Bereiter and Scardamalia 1987) they assert that since a continuous interaction between content-related knowledge and rhetorical knowledge is important for knowledge transformation, the more complex structure of the genre of hypertext may naturally encourage knowledge-transforming. Braaksma et al. (2002) examined the cognitive activities involved in writing hypertext and linear texts and found that planning and analysis occur more frequently in hypertext writing. This led them to conclude that hypertext writing could potentially have a positive effect on the quality of linear writing (although the issue of transfer was not addressed in this work).

Haas and Wickman note that when composing hypertext, the author must pay more careful attention to audience awareness as the reader has much greater agency than with traditional texts, and this changes the relationship between reader and author. There is a blurring of roles which arises from the decentring of the author (Haas and Wickman 2009).

Hypertext has been particularly successful as a reference tool, but it has been less successfully used for storytelling. Despite some prominent examples of hypertext fiction (Joyce 1993; Kolb 1994) and tools designed specifically to support such storytelling (Bolter, Joyce and Smith 1990; Goodman 1990) hypertext fiction has not reached the mainstream. Glassener argues that this is because the non-linearity of hypertext documents is inherently not well suited to storytelling, and the reader is often asked to make choices between links seemingly at random as they are not given enough information to make an informed decision (Glassner 2004).

Interactive fiction is an alternative form of non-linear writing, also referred to as text adventures. The original *Adventure* was a popular early computer game; the first which let the player type in words to interact with the system (Niesz and Holland 1984, p. 114). Essentially the reader navigates through a virtual world by typing text-based instructions, reading

descriptions and taking part in interactive conversations. *Twisty Little Passages* (Montfort 2005) documents the rise in popularity of such games to being PC bestsellers in the 1980s, and reveals the thriving community of interactive fiction authors still creating these pieces, despite the drop in commercial appeal. Indeed, specialist interactive fiction languages are still being developed. For example, *Inform 7* is a language designed specifically for creating interactive fiction which allows the creator to type in source code in a subset of natural language (Nelson 2006). There has been little writing development research exploring the potential of interactive fiction creation, but there is some evidence from educators that texts of this sort can have benefits. Lancy and Hayes explored the potential for playing interactive fiction games to improve children's reading motivation, but also suggested that there could be benefits for writing interactive fiction pieces once the act of playing had been mastered (Lancy and Hayes 1988). In more recent work, Kee et al. report that creating a work of interactive fiction helped improve literacy and social skills amongst elementary school children, although it was noticed that there was disappointment from pupils that the system they were working with was purely text-based (Kee, Vaughan and Graham 2010).

Today, narrative-based computer games, which developed from these early text-adventures combine multimodality with non-linear writing. Narrative-based games are discussed further in the following section.

2.3 Narrative-Based Games

In this section I examine narrative-based games. First, the question of whether games can be said to have narratives is addressed, followed by a discussion of some games which do seem to embody strong narratives, with a particular focus on role-playing games. I then examine how classic narrative theory can help us to understand narrative in games and look at some more recent theory specifically targeted at understanding narrative in games. Relevant narrative theory is then considered, along with related work which has made use of the theory in the area under consideration.

2.3.1 Can games tell stories?

There has been research which suggests that game creation involves storytelling, as discussed in section 2.1, but historically there has been much debate about the relationship between narrative and games. Arguments against the link generally come from two angles, firstly the idea that narrative is inherently opposed to interactivity, and secondly the idea that narrative aspects get in the way of the ludic elements which are truly essential to games, and tend to be tacked on stories which could be replaced without changing the underlying game.

Jenkins (2004) discusses the key arguments around these issues in a seminal paper. One of the arguments against the link between games and narrative is put forward in quote from Adams:

“Interactivity is almost the opposite of narrative; narrative flows under the direction of the author, while interactivity depends on the player for motive” (Adams 1999; cited in Jenkins 2004). This argument focuses in on a rather narrow definition of narrative. Jenkins highlights the extent to which it is preoccupied with the activities of the storyteller at the expense of understanding narrative comprehension, and only addresses classical linear storytelling. There are of course many examples of narratives in which the audience has a say in what direction a narrative will take, be it oral storytellers adapting stories based on audience input or the *Choose Your Own Adventure* books discussed in the previous section (New York: Batham Books 1960-present).

A more subtle, and perhaps more pertinent area of questioning, is whether the quality of narratives are negatively affected by audience/player agency, and whether players feel that they have real choice when playing a pre-planned narrative. Jenkins quotes Costikyan, who sums up these concerns succinctly, saying that “[t]here is a direct, immediate conflict between the demands of a story and the demands of a game. Divergence from a story's path is likely to make for a less satisfying story; restricting a player's freedom of action is likely to make for a less satisfying game” (Costikyan 2000; cited in Jenkins 2004)

Addressing the second of Costikyan’s points first, we come upon a pressing concern for many ludologists; the idea that story elements can get in the way of game play. Giving players a sense of agency is important in all games, whilst conveying a narrative can involve guiding, directing and ensuring a player knows certain information, all of which have potential to work against agency. Juul expresses similar concerns, and also argues that narrative elements are likely to be detached from gameplay, stating that “...narrative tends to be isolated from or even work against the computer-game-ness of the game.” (Juul 1998; cited in Jenkins 2004)

Koster (2004) has also argued that games and stories are entirely distinct, and that story content is clumsily added on to games: “Story, setting, and backplot in games are nothing more than an attempt to give a side dish to the brain while it completes its challenges – sometimes, the hope is that it makes up for an otherwise unremarkable game.” (Koster 2004, ch. 5). It is clear, although perhaps only with hindsight, that this criticism applies only to a very specific type of game.

Lazzaro talks about how to get “more emotion without story” (Lazzaro 2004). Lazzaro does not explicitly address the question of why it should be desirable to avoid story, but tellingly she appears to see story as synonymous with cut scenes. Cut scenes, one way of moving forward the game narrative in which the player watches while an animated and pre-scripted exchange takes place between characters, remove agency from the player. In fact, cut scenes are used less and less, and the player explores the story through conversations and interactions, without having to stop and watch non-interactive cut scenes. Sometimes scripted sequences within the game

engine take the place of cut scenes. These still result in a temporary loss of agency, but are not as jarring as a separate animated cut scene (there are also a wide range of other ways of conveying narrative elements, as discussed in the following sub-section).

Koster and Lazzaro are both referring to games where the narrative is not integrated into the gameplay. Story is seen as an extrinsic motivator in their model (albeit, not a very successful one). As the work on endogenous and exogenous fantasy indicated (discussed in Section 2.1.2), this is only one way in which fantasy can be integrated into a game, and sometimes it is not the most promising way, particularly for educational purposes.

In fact, there are a large number of different game genres and sub-genres, and even within these there is huge variety (Apperley 2006). Some very successful and undoubtedly fun games do use narrative elements as a wrapper, for example we could reimagine the *Angry Birds* series as ‘Hungry Bats’; a game about bats trying to crack open delicious fruits with frustratingly hard shells. The gameplay would remain the same, but the narrative about green egg stealing pigs would have disappeared. There are other games, however, where the narrative is more integral.

Portal 2 has a strong narrative, and the gameplay is intrinsically linked to the narrative context of a testing facility for the experimental portal gun and other futuristic technology. It is also notable for the way it conveys narrative elements without impacting on gameplay. We learn about a complex tale of failing company fortunes and get to know the eccentric CEO (now deceased) over the facility’s tannoy system, with chunks of backstory dispensed as the player reaches different points in the game. The distinction between game backstory and the player taking part in a narrative within the game is discussed further in the following sub-section.

The other side to Costikyan’s criticism was that divergence from a story’s path is likely to make for a somehow less satisfying story. In fact, the extent to which game-narratives really have much genuine divergence from a small number of plot variations is debatable. The *Mass Effect* series famously kept track of over a thousand key decisions which players made, but only provided three main endings to the series (Mass Effect Wikia, n.d.).

Many people do believe that compelling interactive narrative is possible. Interactive storytelling research has traditionally focused on ensuring genuine interactivity, and largely dispensed with gameplay elements. This approach primarily focuses on integrating artificial intelligence techniques with narrative theory in order to generate fully interactive narratives which are not pre-authored prior to the moment of interaction (Cavazza and Pizzi 2006). One of the most prominent examples in the field is Mateas’ work on the interactive drama system *Façade* (Mateas 2001; Mateas and Stern 2003).

By comparison, most games do not go to these lengths to support genuine interactivity. The extent to which game narratives have real interactivity varies greatly between genres; in some games the interactivity can be limited to a character either successfully completing a challenge or dying, whilst in others there are a variety of different routes through a narrative which the player can choose between. However, taking an active role in enacting a narrative is only one way in which narrative can be conveyed through a game, as discussed in Section 2.3.3.

The debate about narrative in games has died down considerably in recent years, perhaps because there have been so many games that successfully include narrative elements. Costikyan himself more recently acknowledged “there are innumerable game styles that do combine stories and gameplay successfully, in ways that evidently appeal strongly to wide audiences” (Costikyan 2007, p.6). In general, interest has turned from the question of whether games can convey narratives to an exploration of how this is achieved, something I examine in the following two sub-sections.

2.3.2 Related narrative theory

Interactive digital storytelling systems, and to a lesser extent, narrative based games, sometimes make use of one or more underlying narrative theories. Narrative theory has also been used in attempting to understand the extent to which games can be considered to convey narratives, and to explore the different narrative structures which exist in these storytelling systems and games. There are a number of different theories and analyses of narrative structure, although none which specifically examine interactive narratives. Structural analyses of narrative all inherit to some extent from Aristotle’s *Poetics*, which first considered narrative art forms in terms of their component elements rather than as a whole (Else 1967). The theories which are most commonly adopted in relation to interactive narrative and games are discussed here, with particular focus on Propp’s work due to its prominence in interactive storytelling systems, and Chatman’s work due to its applicability to multimodal narratives in role-playing games.

One way of using narrative theory in relation to games is as a framework for plot generation. This acts essentially as a ‘formula’ for a compelling plot, which gives specific instructions on which elements to include. In the film industry there are certain works which are often used in this way, such as Campbell’s ‘hero with a thousand faces’ as packaged by Vogler for screenwriters (Campbell 1988; Vogler 1998), and Syd Field’s ‘step-by-step instructions’ for screenwriters, based on Aristotle’s *Poetics* (Else 1967; Field 1984). These also both appear to be popular frameworks for use by games designers, according to a number of handbooks on the topic (e.g. Handler Miller 2004; Bateman 2007; Adams 2010).

Another common use of narrative theory is as a model for narrative or plot in interactive storytelling systems which automate the storytelling process in some way. In such situations a

structure from narrative theory can be used to aid the programmatic representation of concepts and the generation of narrative. Propp's classic work of Russian formalism, *Morphology of the Folktale* (Propp 1968), is one of the most frequently used structural analyses for this purpose. Propp's morphology breaks down Russian folktales (or 'wondertales') into 31 functions or narratemes (the smallest narrative unit Propp found in the tales). It also proposes eight broad character types, including hero, villain and helper. Functions are abstractions of specific plot events, for example 'departure' (hero leaves home, p.39) or 'exposure' (false hero or villain is exposed, p.62) (Propp 1968). The work is highly descriptive; Propp started with a specific set of tales and created a schema which captures their key elements. However, it is often used as model for generating new narratives.

This application of Propp's morphology was first suggested by Murray (1998), who highlighted the potential for the function-based schema to aid in automated generation of interesting and varied narrative elements. GEIST, one of the first storytelling systems to make use of Propp's morphology, generates stories one scene at a time using a collection of pre-authored scenes which are based on specific Propp functions (Grasbon and Braun 2001; Spierling, Grasbon, Braun et al. 2002). Fairclough (2004)'s OPIATE usages Propp's schema as part of a high-level authored narrative which uses case-based reasoning, whilst a low-level 'emergent' narrative is generated at the time of play (the different types of narrative structures, including emergent, are discussed in section 2.3.3).

TEATRIX (Machado, Paiva and Brna 2001; Prada, Paiva, Machado et al. 2002) is an environment for collaborative drama for primary school children. Children work together to create a story, with each child controlling a character which has been assigned a role to play in the story taken from the character roles in Propp's classification, although the functions themselves are not used.

Propp's theory has also formed the basis for a tool to support children's story planning in digital (Hammond, Pain and Smith 2011) and paper-based tools (Rodari and Zipes 1996). However, some have found Propp's morphology too constraining for interactive storytelling systems (Tomaszewski and Binsted 2007), and there have been a number of other criticisms on a more general level relating to the circularity of Propp's method (Lieberman 1984) and his use of 'catch-all' categories for unclear elements (Levi-Strauss 1984; Bordwell 1988). A further problem with Propp's approach is the narrow selection of narratives he addresses; Seymour Chatman argued that Russian folktales have fairly basic narratives, simple characterisation and homogeneous plots (Chatman 1978).

Chatman's own narrative theory builds on the structuralist tradition, focusing on explaining the '*what* and *way*' of narrative. Essentially, this division refers to the story (or content) and the

discourse (or expression) of a narrative, as shown in Figure 2.2. Unlike Propp's morphology, Chatman's theory does not discuss narrative elements at the level of specific examples of plot events, meaning it is not suitable for use in generating narratives – either automatically, or as inspiration for games designers' 'organic' creation of narratives.

However, despite being written before the existence of games with strong narrative elements, Chatman's theory is well suited to understanding game-based narratives, and has been used to examine narrative in role-playing games (Mallon and Webb 2005; Carr 2006) and interactive digital storytelling systems (Ben-Arie 2009; Jantke 2009).

Chatman's theory highlights the extent to which the same narrative can be manifested in a range of media, including films, comic strips, paintings, sculptures, dance movements and music. This 'transposability' is cited by Chatman as strong evidence for arguing that narratives are structures independent of medium, but his theory is also of use in understanding how games can convey narratives, and exploring the ways in which media differ in their specialisms and propensity to express certain elements and obscure others. Another key aspect of Chatman's theory is the extent to which it applies to 'non-narrated' narratives. Whilst this may seem an oxymoron, Chatman explains that the term is merely shorthand for "a narrative that is not explicitly told" (Chatman 1978, p. 53), and argues that there is no need for a separate category for drama. This is significant because game narratives are often not explicitly narrated, leading to some theorists focusing on interactive drama as distinct from narrative (Laurel 1991; Mateas 2004).

Within Chatman's model, the essential elements of the story can be separated into the chain of events (actions, happenings) and the story existents (characters, items of setting). Actions are events in which a story existent is the agent of an event, whereas happenings are events in which an existent is the 'patient' – the acted upon (Chatman 1978, p. 32). Events are also either kernels, major events which are essential to the plot and cannot be deleted without destroying the narrative logic, or satellites, minor events which are not crucial to the narrative (Chatman 1978, p. 53-54). Story existents are considered characters if they perform at least one plot-significant action (kernel), otherwise they are considered items of setting (Chatman 1978, p. 32). Chatman notes that characters do not have to be 'people', and describes how objects can be endowed with 'characterhood' if they engage in "suitably anthropomorphic action" (Chatman 1978, p. 25).

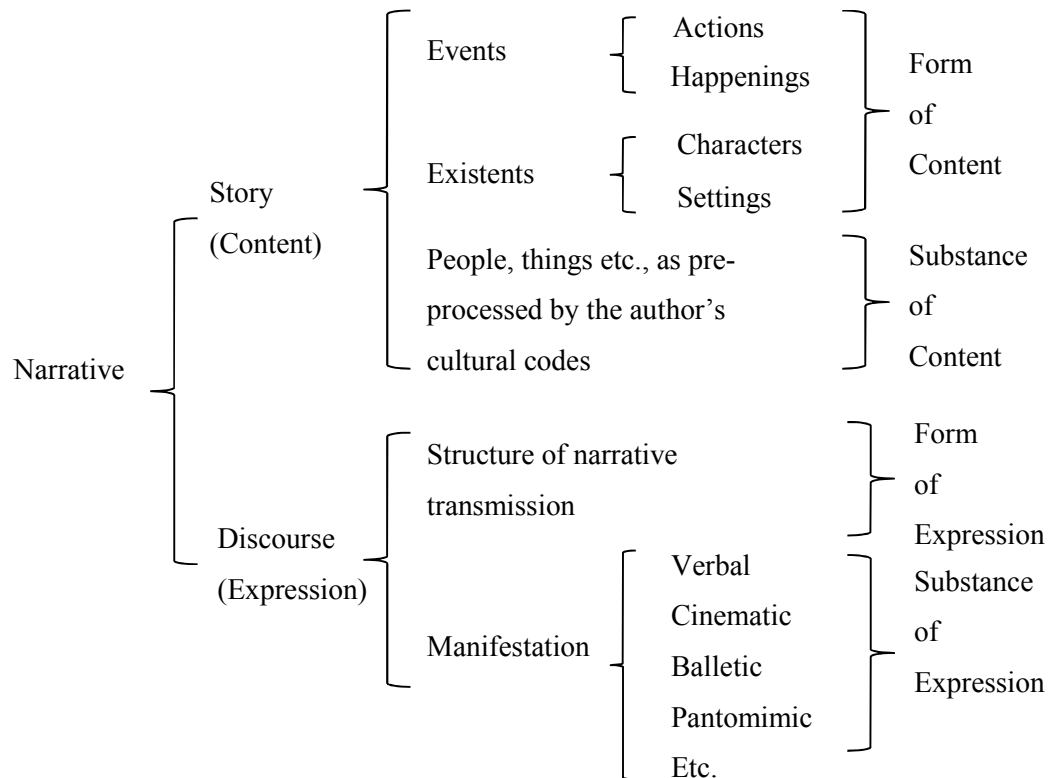


Figure 2.2: Narrative as a semiotic structure

Source: Adapted from Chatman 1978, p. 26

Interestingly, although Chatman does not discuss the possibility of branching narratives, he describes kernels as “...branching points which force a movement into one of two (or more) possible paths” (Chatman 1978, p. 53). In Figure 2.3 Chatman illustrates the difference between kernels (squares) and satellites (dots), by showing that kernels imply possible but unfollowed narrative paths (diagonal lines). This diagram foreshadows the branching diagrams often used in the discussion of interactive narrative, and discussed further in the following section.

Moving to consider the discourse, or narrative expression, Chatman characterises this as a connected sequence of narrative statements. Through this sequence of statements the discourse states the underlying story, although not necessarily in the order in which the story events took place. One key aspect of the discourse is the structure of narrative expression, which we might think of as plot, which defines the order in which underlying story elements are revealed to us. Narrative statements are either *process* or *stasis* statements. Process statements are in the mode of *do* or *happen* – someone did something or something happened, whereas stasis statements are in the mode of *is* – someone/something existed or someone/something had certain specified traits.

The other key component of narrative discourse is its manifestation. Chatman is very clear that narrative statements are independent of the particular medium of expression, and says that statement “includes dance statement, linguistic statement, graphic statement, and so on” (Chatman 1978, p. 31). The issue of multimodality, discussed extensively in Section 2.2.4, is not explicitly addressed in Chatman’s work. His model considers alternative manifestations of narrative at the level of medium, but does not account for the lower level of choice of mode within medium. He does address the issue in passing when analysing a comic strip, saying that drawing elements must be distinguished from two different types of written elements – dialogue and legend (signs within the comic). However, most attention is given to the higher level aspect of medium.

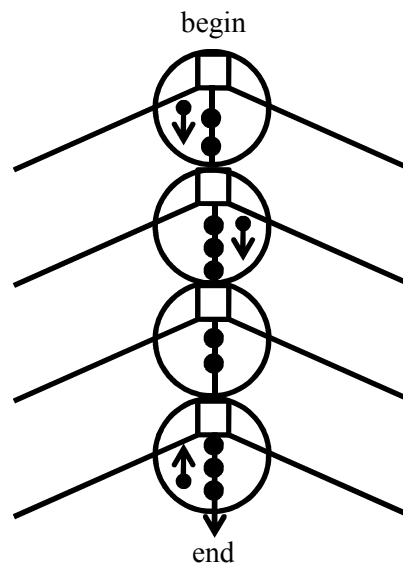


Figure 2.2: Kernels, satellites and narrative paths

Source: Adapted from Chatman 1978, p. 54

Whilst the basic underlying narrative content and structures are independent of medium, Chatman describes how a medium may specialise in certain narrative effects and not others. One particular area in which Chatman explores this is the extent to which the audience must make inferences about indeterminate elements. For example, cinema often presents characters without us knowing the content of their minds, but in novels this is much more rare. Conversely, in novels some visual aspects may be left unspecified, whilst in films it is generally necessary to give representations of characters and settings leaving no visual aspects undetermined (Chatman 1978, p. 30). In investigating narrative in games then, we should expect a specialism in a different set of narrative effects.

2.3.3 Game narratives

Most work addressing narrative in games focuses on the extent to which players can take part in a narrative, and the extent to which they can make meaningful choices within that narrative. This is clearly a central way in which narratives are experienced within games, but it is certainly not the only way, as Jenkins outlines in his work on game design as narrative architecture (Jenkins 2004). In addition to pre-planned enacted narratives in which players can witness and take part in narrative events, Jenkins argues that games can also support emergent and embedded narratives, and that game worlds can be evocative spaces which draw on connections with narratives expressed in other media (Jenkins 2004).

Jenkins describes the ways in which games support spatial storytelling. He places heroes' odysseys, travel narratives and quest myths within this category of narrative, which often centres around journeying through an environment and traversing contested spaces (Jenkins and Squire 2002).

Other genres of narratives, such as fantasy and science fiction, also often made use of spatial storytelling as well as world-building, in which a believable fantastic or futuristic environment is described in great detail and used to create immersive settings in which stories take place.

Chatman's work on narrative specialisms suggested that games too are likely to have certain aspects of narrative which are portrayed more fully than in other environments, and it seems that exploring expansive worlds and traversing contested spaces are promising candidate narrative specialisms for game. As Jenkins highlights: "Games, in turn, may more fully realize the spatiality of these stories, giving a much more immersive and compelling representation of their narrative worlds" (Jenkins 2004, p.122). The ludic elements of games are essential to this aspect of narrative. The contested spaces model in which players must traverse an environment in spite of obstacles and enemies directly inherits from more traditional game forms such as board games (Jenkins and Squire 2002).

As noted above, Jenkins highlights four different ways in which environmental storytelling creates the pre-conditions for an immersive narrative. These are not mutually exclusive and can be used in conjunction with one another.

Here we first examine the way in which games can allow the player to take part in and witness narrative events within the game world. This is the mode of narrative which has received the most discussion and attention, and there have been many accounts of how games can support players in experiencing enacted narratives. These tend to focus on the design of a complete interactive plot, although as Jenkins points out localised micro narratives can exist within a game. It is with enacted narratives that the question of interactivity is the most pressing. As the

player is taking part in the narrative, and has agency within the game world, there is a need to provide a sense that their actions are having an effect on the way the narrative is playing out. In truth, in many cases this is just an illusion, and the field of interactive storytelling is much more focused on providing genuine interactivity than the games industry. Mateas, for example, considers replayability without a sense of determinism to be important, and one of his aims has been to work towards an interactive narrative system that can provide this (Mateas 2004).

Aside from revelations of determinism on replay (which we do not object to in other narrative forms) it is hard to see why it would be important for a game to have a genuinely interactive narrative, so long as the illusion is convincing. As highlighted by Jenkins and Squire (2002), one of the key challenges of game design is guiding the player along a predetermined path whilst making them feel that they are in control. In terms of enacted narratives, there are a number of models which games designers use when trying to achieve this illusion of control.

Sometime plots can be entirely linear, but there can be choice in gameplay relating to which challenges to tackle. In such games, the key story events – kernels in Chatman’s terminology – remain the same no matter what happens during these interludes, as shown in Figure 2.4. Meadows refers to this as a *nodal plot structure* (Meadows 2002, p.64), whilst Ince characterises it as *linear story, non-linear gameplay* (Ince 2007, p.50), and Bateman called the technique *gating the story* (Bateman 2007).

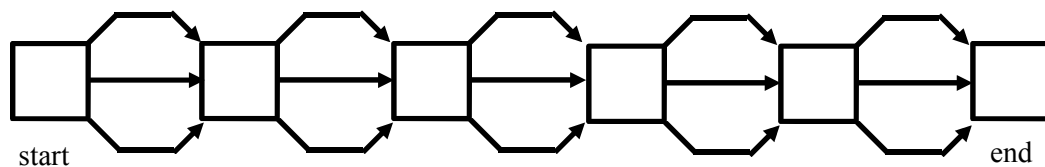


Figure 2.3: Linear plot with non-linear gameplay

Source: Adapted from Ince 2007, p. 50

In the above approach the player will not be offered a chance to change the course of the narrative, although there is usually an implicit alternative ending in the form of the player failing in their mission and dying (albeit, temporarily). Games that use narrative as a wrapper tend to make use of plot structures of this type, for example games in the *Mario* series. However, games with more integrated narratives do also use this approach, often in conjunction with other elements such as embedded narratives in addition to the enacted narrative: *Portal 2* fits into this category¹.

¹ Of course, whether or not games are considered to fit into these categories depends on one’s definition of key plot point.

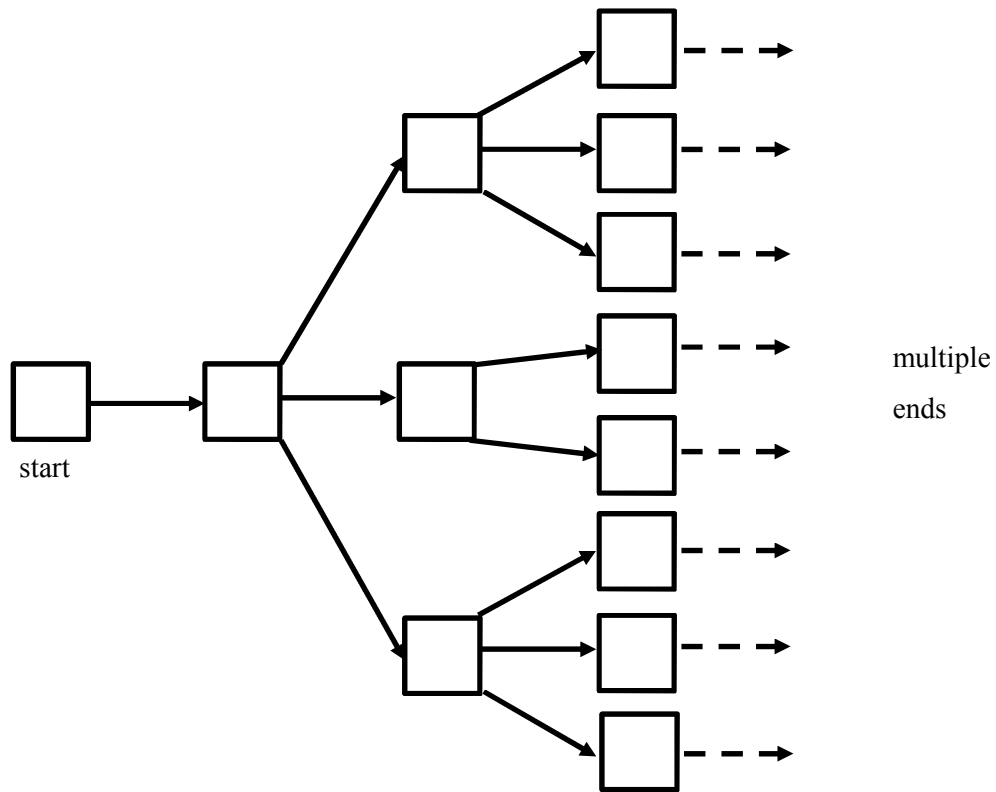


Figure 2.4: Branching story

Source: Adapted from Ince 2007, p. 50

Many games do include some levels of genuine choice in how the narrative progresses, particularly in the role-playing game genre. These are referred to as *branching stories* (Ince 2007, p.50-52, Bateman, 2007, p.76-77) or *modulated plots* (Meadows 2002, p.64). Within this category, the extent to which the branches lead to different endings varies. Figure 2.5 shows a branching plot where the choices keep expanding outwards and will eventually lead to a large number of multiple endings. An alternative model, shown in Figure 2.6, is to have branches recombine so that, although there are key plot events which differ along the way depending on choices, all players end up at the same story conclusion. Of course, there are many combinations of the two approaches, and most games with branching enacted narrative tend to end up with a compromise somewhere between the two. The *Mass Effect* series with its thousand plus choices and three main endings is an obvious example of this (Mass Effect Wikia, n.d.).

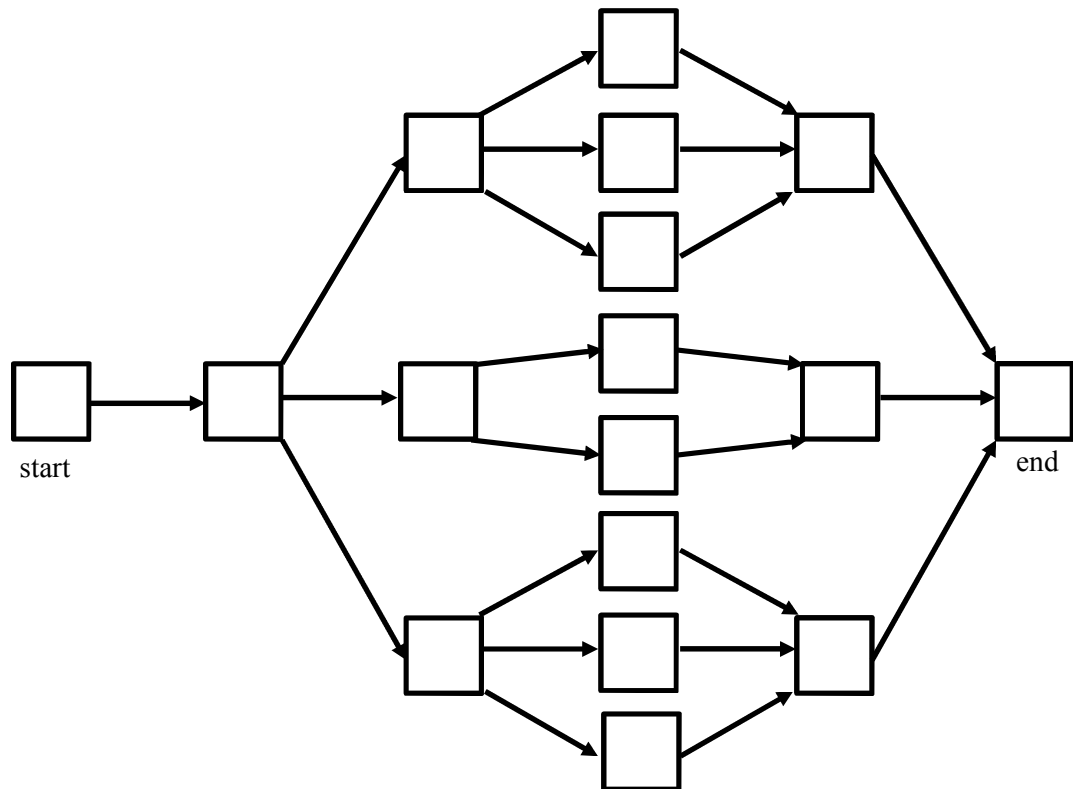


Figure 2.5: Branching story where branches recombine

In emergent narratives there is no pre-structured plot, but narratives can emerge at the point of game play through interactions between characters and objects. These are still essentially enacted narratives, but they are not an enactment of a pre-planned route. Research into the design of emergent narrative environments has been led by the interactive storytelling field (Aylett 1999; Louchart and Aylett 2004). However, many games could also be considered to support emergent narratives, as Jenkins discusses with reference to *The Sims* (Jenkins 2004, p.128). This is a particularly good example, as most games with emergent narratives have a simulation aspect to them. The focus in designing such environments is defining micro level behaviours of characters and objects so that there is good potential for higher level narrative patterns to emerge. For example, Jenkins highlights the extent to which design decisions within *The Sims* have been made “with an eye towards increasing the prospects of an interpersonal romance or conflict” (Jenkins 2004, p.128).

From an interactive storytelling point of view it has been argued that there must be a sufficiently rich set of character behaviours for a narrative to emerge (Aylett 1999, p.85), and in line with the general approach of the field this challenge has often been tackled with the use of artificial intelligence techniques.

There are a number of ways in which an environment can be designed for narrative possibilities without specific narrative paths being planned in advance. An obvious appeal for this approach is that it supports genuine interactivity, and players will not experience a lack of freedom

resulting from being forced to follow a pre-planned path. However, a potential drawback is that there is no guarantee that a narrative will emerge, or of the quality of the narratives that do emerge (Aylett 1999, p.85). In general there is more emphasis on the extent to which players and observers interpret the events taking place as a narrative.

There are a number of examples of some powerful narratives which have been written about specific games within *The Sims*. A particularly interesting case is a narrative written in blog form describing the events from a *The Sims 3* game in which the central characters are Alice and Kev, a young girl and her father (Burkinshaw 2009). In addition to the inbuilt behaviours and rule sets which apply by default within the game, Burkinshaw set up a number of factors that made the potential for interpersonal conflict particularly high for these two characters. Firstly, the characters are homeless, and all in-game currency was taken from them at the start of the game. The characters were also set up with some specific traits and preferences: Kev's character does not like children, is very bad tempered and selfish, whilst Alice is hard working, and selfless, but filled with self-doubt. Burkinshaw posted 60 blog posts chronicling the experiences of the characters, and there were some very moving narrative elements which emerged. For example sleeping in the local park means that Alice was often very tired, and on more than one occasion snuck into other people's houses to sleep. One local family took pity on her and used to let her sleep in their house sometimes, but as her character gets older she is no longer seen as cute by them, and they turn her away when she arrives at their house looking for help. Burkinshaw did intervene in the simulation to some extent, but states that "a surprising amount of the interesting things in this story were generated by just letting go and watching the Sims' free will and personality traits take over" (Burkinshaw 2009).

Embedded narratives, a further approach described by Jenkins, are those where a story is revealed through the game, but it is not one in which the player actively takes part. This method is often used in conjunction with enacted narratives to convey backstory, and Jenkins argues that the combination of these two types of narrative portrayal can allow for "a balance between the flexibility of interactivity, and the coherence of a pre-authored narrative" (Jenkins 2004, p.127).

Jenkins explains how a story can be seen as a body of information rather than a temporal structure, essentially the distinction between the underlying story 'content' in Chatman's theory, and transmission of that story through discourse. As Chatman highlighted, there are multiple ways in which story elements can be revealed, and narratives often do not unfold completely in line with the story timeline. Similarly, in games there are narrative elements which relate to backstory or those which relate to a converging or parallel story which the player is not actively taking part in. This narrative information can be seen as embedded within the game. These

elements can be embedded in innumerable ways, including through dialogue, through text in game items, through area design, or through in game audio as with the *Portal 2* example discussed in Section 2.3.1. Referencing Carson's work on mapping theme park design to game level design, Jenkins introduces the idea of 'staged areas' or areas designed to reflect some elements of recent or distant backstory – for example the charred remains of a fire or a house with a broken door (Carson 2000, cited in Jenkins 2004, p.127).

Detective stories are a popular genre that make heavy use of embedded narratives, with the story of a crime often revealed in parallel to the overall narrative of the investigation. Games such as *LA Noire* and *Phoenix Wright* involve the uncovering of clues which reveal an embedded narrative of a crime already committed, whilst the player takes on the role of detective or lawyer enacting the narrative of the criminal investigation.

According to Jenkins, games can also function as evocative spaces by drawing on pre-existing narrative knowledge and evoking settings from narratives in other media within a game world. The design of amusement parks is again a relevant comparison here. Jenkins quotes Carson in describing how narrative elements are portrayed through park design: "The story element is infused into the physical space a guest walks or rides through. It is the physical space that does much of the work of conveying the story the designers are trying to tell... Armed only with their own knowledge of the world, and those visions collected from movies and books, the audience is ripe to be dropped into your adventure. The trick is to play on those memories and expectations..." (Carson 2000, quoted in Jenkins 2004, p.123). Again, using games as evocative spaces can also be done in conjunction with the other approaches Jenkins discussed. For example, in *The Old Republic*, environments familiar from the *Star Wars* films (such as locations on the planet Tatooine) are recreated, evoking the films' narratives, whilst a different narrative set hundreds of years before the films is enacted by the players.

In this sub-section I have examined a number of ways in which narrative elements can be portrayed through games. In the following sub-sections game creation tools suitable for use by young people are discussed, along with theory relating to interface design for educational software.

2.4 Supporting the Creation of Narrative-Based Games

Some form of software support is necessarily required for game creation, particularly for young people who lack programming and 3D graphical design skills. In this section I first examine the existing game creation tools available for use by young people, and consider their suitability in terms of support for the creation of narrative-based games. After identifying the most appropriate existing tool to build on in this research, I review literature on the importance of

interface representations in the design of educational tools, and consider this existing work in relation to the designated tool.

2.4.1 Existing game creation tools for young people

In recent years there has been a proliferation of tools which make it possible for young people to create their own computer games. However, many of these are not well-suited to creating narrative-based games and others are only suitable for those with fairly advanced technical skills. There are also many tools, well-suited to novices, that allow the creation of multimodal narratives. Some of these do support interactive elements, but they do not provide the rich possibilities for spatial storytelling discussed in the previous sub-section, and are unlikely to harness the positive motivational associations of game creation. Described below are some key tools which fall into the categories outlined above, as well as some tools which succeed in supporting young people without specific technical skills to create their own narrative-based games, complete with immersive 3D game worlds.

There are a number of tools available which allow young people to create multimodal narratives through animations, films or cartoon strip style stories. In this genre the user has little or no input into the plot and the story is predefined by one or more authors ahead of viewing. Tools designed to support children creating non-interactive narratives of these kinds include *Kar2ouche* (Immersive Education 2004a), *KidPad* (Hourcade, Bederson, Druin et al. 2002) *StoryBuilder* (Antle 2003), and *Media Stage* (Immersive Education 2004b). These tools provide good support for adding multimodal content to a story, such as scenery and audio content. For example *Kar2ouche* supports children in creating animations by providing audio and 2D visual resources related to a variety of subject areas, and also allows users to import their own resources. Users can also create visual representations of a linear plot in *Kar2ouche* using the story boarding facility.

Looking Glass (formally *Storytelling Alice*) offers young people extensive support for creating animated stories by providing high level animations involving social interactions, as well as character and scene resources in keeping with the stories target users want to tell (Kelleher et al. 2007). There is also some support for adding interactivity into the stories, although the stories produced are primarily animations rather than games, and it is not possible to create expansive 3D worlds which can be explored. Additionally, storytelling is not the end goal of the tool; it is used as a means of encouraging middle school girls to engage in programming activities.

There are a number of tools available which make it possible for young people to create their own computer games, but many of these are not well-suited to the creation of narrative based games. Many game-creation tools aimed at young people focus on support for programming and scripting. *Star-Logo TNG* (Begel and Klopfer 2007) provides support for building simulation-

based games. The focus is on providing users with a suitable interface for setting low level detail such as defining how different objects will react in specific situations, for example, when a character comes up against a wall. It is possible to create a game with narrative elements using this tool, but as the game needs to be built up from a low-level interaction by interaction, it is difficult and time-consuming to build anything which could be considered a narrative-based game. Similarly, *Scratch* (Maloney, Peppler, Kafai et al. 2008b), although not designed primarily for game creation, provides excellent support for the programming of basic game functions, as well as offering extensive online support in the form of a large community of users, but again it is not well suited to creating games where the narrative is a key and integral element. *AgentSheets* (Repenning et al.) also focuses on the development of computing skills and takes a bottom-up approach which does not fit well with narrative creation. Additionally, none of these programming-focused tools are well-suited for creating immersive 3D worlds of the type found in commercial games.

There are an increasing number of commercial games creation development toolkits made available for use by amateur enthusiasts, such as *Unity* (Unity Technologies) and the *Unreal Development Kit* (Epic Games). These are incredibly powerful tools, and are used by professional games developers to build a very wide range of commercial games, but they both have a high ceiling and are inaccessible to most children of the target age range, particularly those without existing technical skills. A set of resources for use with Unity designed specifically for young people was announced whilst this research was in its final stages. *Games Unpacked* (Abertay University and BAFTA n.d.) allows young people to create commercial quality 3D games. However, even with these additional resources the tool still has a fairly high entry level, and although keen and committed young people with existing technical skills would no doubt find it very useful, it would be likely to be beyond the capability of many of the young people involved in the studies in this thesis.

Mission Maker (Pelletier and Burn 2005; 2007) allows users to create 3D adventure games using a GUI and a range of readymade art resources, and also allows them to import their own images and record their own sounds. This tool is specifically designed for use by young people, and focuses on higher level elements of game play, such as creating quests and adding arrangements of media such as voice and custom textures. It is possible to create games with branching narratives using *Mission Maker*, but the control of the narrative is implemented at a very low-level through specifying rules which should apply in different situations. There is little interface support for high level plot devices such as interactive conversations, with even a simple dialogue requiring multiple steps, and no branching representation available for conversations. There is excellent support for tasks such as level design and scripting behaviours, but less support for narrative development.

The *Neverwinter Nights 2 Electron toolset* is sold with the commercial role-playing game, *Neverwinter Nights 2* (NWN2) (Obsidian Entertainment 2006). It was intended for use by enthusiastic players of the game who wanted the chance to create their own adventures of a similar type using the NWN2 game engine. It allows users to create fully interactive games with commercial quality graphics. The readymade art resources and an easy to use area editor allow young learners without 3D graphics skills to create games that are visually impressive. The toolset centres around 3D representations of the game areas, and allows characters and objects to be dropped in to the area quickly and easily, and for these tasks as well as sculpting of 3D landscapes to be carried out via direct manipulation –effectively a WYSIWYG editor for game areas.

The NWN2 toolset is potentially well-suited to creating narrative-based games and provides support for the creation of branching conversations as well as creating expansive 3D areas. Choosing a tool with 3D graphics of commercial quality was important because this allows young people to create games which look and feel like the games they play at home, a powerful motivating factor, as well providing the “immersive and compelling representation of...narrative worlds” described by Jenkins (2004, p.122) in relation to spatial storytelling.

This toolset, and its predecessor shipped with the original *Neverwinter Nights*, have been used to support young people in storytelling tasks in a number of research studies (Good and Robertson 2004; Robertson and Good 2004; Carbonaro, Cutumisu, McNaughton et al. 2005; Robertson and Good 2005a; Robertson and Good 2005b; Szafron, Carbonaro, Cutumisu et al. 2005; Good and Robertson 2006; Robertson and Good 2006; Howland, Good and Robertson 2007; Carbonaro et al. 2008; Carbonaro et al. 2010).

However, there are a number of potential problems with using commercial toolsets such as the NWN2 toolset with young people for educational purposes. Firstly, whilst the toolset provides GUI support for a range of game creation tasks, creating complex narratives requires the use of the inbuilt scripting language NWScript. This requires programming skills which most children do not have, and low-level tasks such as this distract attention from the higher-level story writing task. For this reason, a visual programming language has been designed for use with this tool (Howland, Good and Nicholson 2009; Nicholson, Good and Howland 2009; Good, Howland and Nicholson 2010; Good 2011; Good and Howland 2012).

The creative process of game design is also potentially challenging for young people. Keeping track of game ideas and tasks lists, as well as complex branching conversations is a difficult process. Adventure Author (Robertson and Nicholson 2007) scaffolds the creative process of game design through a suite of plugins which offer excellent support for ideas generation and evaluation, as well as providing an improved interface for creating interactive conversations.

The *Neverwinter Nights 2* toolset, in combination with the additional support tools already designed for educational uses of the tool, provides a way for young people without technical skills to create narrative-based games with expansive 3D areas, and is the underlying tool used in this research. However, to provide the best opportunity to explore whether narrative-based game creation can support the development of writing skills I examined opportunities for improving the support provided by the toolset specifically for conveying interactive and multimodal narratives.

2.4.2 Representational support for narrative-based game creation

Creating a multimodal interactive narrative is a complex task; the narrative is composed of many different elements which are woven together when the game is played to allow the story to unfold in one of potentially a number of ways as the player explores the game world. A branching narrative can quickly get unwieldy because each choice point brings additional possible paths (as illustrated in Figure 2.5, Section 2.3.3). Whilst working in a game creation toolset, the disparate elements of conversations, character appearances and behaviours, the design of locations and the placement of objects and characters are all represented separately. As discussed in 2.2.2, external representations are crucial for writing (Sharples 1996), but no representational support is currently available for creating and managing interactive, multimodal narratives within a computer game.

When creating a narrative-based game there is no equivalent of reading back over what has just been written. Instead it is necessary to exit the toolset, load up the game and play through it: a laborious process (more akin to the cycle of computer program editing and running) which can only be done intermittently. This can interrupt the flow of writing as the ‘reading’ of a game is necessarily detached from composing and revising.

With a commercial game, a team of writers will often be involved and they will use techniques similar to those used by filmmakers, making use of representations such as storyboards and dialogue scripting to support the storytelling activity as required (Handler Miller 2004; Bateman 2007). However, these are experts who have already developed the skills in question, and young people with no previous experience or skills in the area are likely to require additional support.

Keeping track of information about the narrative elements within a game is a complex task, and difficulties in managing this could make it harder for young people to develop the associated writing skills which will be so potentially useful to them. Additional representational support for storytelling may allow designers to get a better sense of how their game narrative is developing while they are in the act of creating it, helping them to create a better underlying story, convey it more effectively through narrative discourse within the game, and potentially,

gain a deeper understanding and command of the multimodal and interactive writing skills they are using.

As discussed in 2.2.2, the traditional writing process can be supported through external representations used by the author as part of the planning, composition, review and revision stages. The choice of representations in software interfaces is always important, particularly when building interfaces for educational software. These interfaces have to support the user's learning as well as ensuring that interaction is straightforward and intuitive.

There are some representational support tools available designed to help skilled adult designers of interactive stories and virtual reality environments. Scenejo provides a graphical authoring system for managing interactive dialogues which make use of a chat bot, and includes a high-level plot graph for defining the overall structure of the dialogue (Weiss, Müller, Spierling et al. 2005; Spierling, Weiß and Müller 2006). VRBridge aims to make the authoring of virtual reality environments accessible to end-users by providing a series of useful representations to support the design task (Winterbottom, Blake and Gain 2006; Winterbottom and Blake 2008). Whilst these are not aimed at young people, and do not have learning goals around writing, their representational choices are nonetheless interesting and are discussed further in relation to specific design decisions in 3.4.5 and 3.4.6.

In the remainder of this sub-section, higher-level representational theory is examined. It is generally accepted that a single representation is not sufficient to represent all aspects of any complex entity (Schwarz and Dreyfus 1993), and a 3D computer game is certainly such an entity. It is clear then, that any given representation of a computer game will highlight certain aspects of the game over others. The match-mismatch hypothesis (Gilmore and Green 1984) states that where a representation highlights a certain type of information, tasks using that type of information will be easier to perform than those requiring other types of information.

Where the required information is implicit in a representation and needs to be inferred, the task will be harder than if the information was presented explicitly. Self-report by a group of children who used the NWN2 toolset over a week long workshop indicated that 3D area design was the activity on which most time was spent (Robertson and Good 2004). Whilst 3D area design is a very important part of creating a narrative-based game, it may not be desirable to emphasise this aspect of the task over all other tasks relating to narrative creation. Certain elements of narrative can be conveyed visually, but many others rely on events and interactions. If only the visual aspects of the area design are represented, it may be hard for young designers to keep track of the interactive elements which can reveal embedded narratives and allow players to take part in enacted narratives within the game.

At present, when trying to write an interactive story, users of the NWN2 toolset have to keep an internal representation of the (potentially complex) branching plot in their minds. Trying to hold a mental representation in working memory over a period of time can lead to cognitive overload, something which is to be avoided in learning environments (Mayer and Moreno 2003). Creating an interactive narrative can place a huge load on the user and may understandably lead them to focus on other aspects of game creation which are better supported. Providing a representation of narrative structure could support cognitive off-loading and allow more complex narrative elements to be built up. This is likely to be needed in addition to rather than instead of the existing representation.

Making a task easy to perform by providing explicit representation of the required information and supporting cognitive offloading when working on complex tasks is beneficial. However, making a task as easy as possible is not always the aim in educational software. There are a number of tasks which the current NWN2 toolset interface makes very quick and easy, including the creation of an area, and adding new characters, objects and scenery to the area. Whilst it may seem beneficial for composition related tasks such as these to be easy to carry out, easier is not always better when it comes to educational tools. When the aim is to help students to learn, having an interface which make certain tasks too easy can work against this aim (Brna, Cox and Good 2001). For example, in the NWN toolsets the user can ‘create’ a character simply by dragging a character model title from a list into the 3D area. A new character now exists in the game world, but it is a generic character with default options chosen without any input from the user. Creating a character is an important skill in creative writing, but the toolset makes this an insignificant process. The user has no opportunity to practice developing a well-rounded character, or to reflect on the character’s motivations or back story. The task is only ‘made easy’ by hiding the complexity with which the user needs to engage if they are to develop skills in creating characters.

Norman distinguishes between experiential and reflective cognition (Norman 1993), and expresses concern that using multimedia learning environments can encourage experiencing when one should be reflecting. Experiential or ‘reactive’ cognition does not require deep thought and is event driven with automatic reactions following from input. Reflective cognition requires much deeper thought and tends to be slower and more laborious. It also requires the ability to store temporary results and use those results in further thought processes. For this reason external representations can facilitate reflective cognition by allowing more complex chains of reasoning to be built up, providing further evidence that representational support should be given for complex composition tasks such as structuring an interactive multimodal narrative.

Choice of representation can completely alter the mode of cognition used in a task. Svendsen (1991) concluded that whilst direct manipulation interfaces, in which tasks are often achieved by dragging and dropping graphically represented elements, can be very user-friendly, they can actually hinder problem solving if they are supportive of thoughtless action. A number of other studies have also indicated that direct manipulation interfaces are not always desirable in educational applications (Trudel and Payne 1995; Golightly 1996; Holst 1996; Rappin, Guzdial, Realff et al. 1997). This effect has been explored in relation to assistive interfaces which externalise task relevant information in an attempt to improve usability (e.g. greying out inappropriate menu options) (van Nimwegen, Burgos, van Oostendorp et al. 2006). This research indicated that such representational assistance can be counterproductive where the goal is learning, and led the authors to suggest that designers of educational systems consider intentionally making interactions ‘more difficult’ or ‘less assisted’. So, whilst it is important to represent the relevant information over the irrelevant, it is also crucial that tasks are not made too easy through representational support; the learner needs to engage in considerable reflective cognition in order to develop the desired skills.

Although most work in this area has focused on direct manipulation, it is really only a specific case in a more general model of how interfaces can support learning. In each of these studies it is not direct manipulation itself which is the problem, but the tendency for direct manipulation interfaces to encourage unreflective approaches to problem solving, such as trial and error. In each example the direct manipulation elements of the interfaces allow users to rely on interface feedback to achieve tasks, placing them in a reactive mode indicative of experiential cognition rather than the deep thought mode required for reflective cognition. However, this is not a necessary characteristic of direct manipulation. In fact, it is the *level of granularity* at which the direct manipulation takes place which is key. Svendsen’s study uses a command line tool as the non-direct manipulation condition, but an onscreen keyboard tool which allows characters to be dragged in one-by-one could allow typing in a command line through direct manipulation. However, because the level of granularity would be so low, the user would be unlikely to adopt the unreflective trial and error approach which hindered the problem solving (although the interface would clearly be problematic in a number of other ways).

The important distinction is between selection, which is quick and easy and can be done without deep thought, and composition, which requires considerable thought and effort. Direct manipulation interfaces often limit users to selecting between one of a given number of choices, as in Svendsen’s study, but this is not necessarily the case and direct manipulation interfaces can support composition tasks if the granularity at which the manipulation takes place is small enough.

The key consideration for educational tools is that extensive reflective thought should be applied by the learners to the right activities. A game creation interface which made the task of saving the game into a reflective activity which required deep thought would be unsuccessful (unless the aim was to teach about the underlying process of writing a game file to disk). Similarly a complex scripting language is an undesirable way of creating in-game events (unless the aim is to teach coding skills). As our aim is to develop writing skills, the interface should encourage deep reflective thought when it involves the practice and development of those skills, which are naturally composition-based tasks. Other aspects of game creation should be carried out easily through selection to avoid distraction and unnecessary cognitive effort.

2.5 Chapter Summary

The research reviewed here provides evidence from writing theory and game creation research which indicates that game creation has potential as an activity for developing writing skills for young people aged 11-15. A review of existing tools and work on the importance of external representations in educational software suggests that there may be benefits to designing additional representational support for the activity of narrative-based game creation. In addition to this grounding in theory and literature it will be essential to gather input from experts with real world experience of teaching young people writing skills, and to seek the involvement of target users of the system. The following chapter addresses both the software support and the broader contextual support required for the activity of game creation where the aim is to develop writing skills.

3 Designing Support for Narrative-Based Game Creation

3.1 Introduction

This chapter describes the process of designing support for narrative-based game creation with a view to encouraging development of writing skills for young people aged 11-15. As discussed in Chapter 1 (p. 5), a learner-centred design (LCD) methodology was adopted, based on the CARSS framework (Good and Robertson 2006a; Robertson, Good, Howland et al. 2012).

An initial consultation with teachers and pupils was conducted to determine the best approach for supporting writing development through game creation. Following this, an extensive participatory design process was carried out through studies conducted during real-world game making projects. During these projects I explored how young people told stories through game creation and the ways in which they could be better supported. These studies contributed directly to the design of the software tools, but also provided insight into the overall process of game creation for the target users, and the extent to which they tried to convey narratives within their games. The differing contexts of the game creation projects in these design studies also provided insight for the structuring of the final evaluative studies. Additionally, these studies contributed to the design of the evaluation measures.

Work was carried out in the context of four design study settings, as well the consultation, which involved teachers from various schools. Table 3.1 shows details of the study settings along with information about when the work was carried out and the sub-sections within this document which pertain to the practical work.

Table 3.1: Study Settings Overview

Date	Activities	Section(s)
Aug 07 / Apr 08	Teacher consultation interviews – Various schools	3.3.1
May 08	Pupil consultation questionnaires – School A	3.3.2
May 08	Design Study 1 – School A	3.4.1, 3.5.5
Oct 08	Design Study 2 – Workshop A	3.4.2, 3.5.6
Jun 09 / Jul 09	Design Study 3 – School B	3.4.3, 3.5.6, 3.5.7
Aug 2009	Design Study 4 – Workshop B	3.4.4, 3.5.7

Formal ethical approval was sought and given for all design activities described here. In the school studies, as the game creation project was integrated into normal classroom activities, key aspects of the task were deemed compulsory for all pupils by their class teacher. Written parental consent was obtained for all activities which were in addition to standard classroom activities, including collection and usage of voice, photo and video data where appropriate. Where parental consent was given, pupils were then given a choice about whether or not to volunteer for design activities. Examples of the consent forms which were completed by parents of all children taking part in design activities, as well as additional pupil assent forms used in Design Study 3 can be found in Appendix A.1.

The chapter is structured to first address the more general findings from the design process, with outcomes from a teacher and pupil consultation described in 3.2, followed by a description of the game creation contexts that were examined during the design work and a summary of key observations which had implications for the overall direction of the design and the evaluation. In the final part of the chapter I examine findings from the design studies, with reference to specific tools, in conjunction with key theory on representational design for educational applications.

3.2 Initial Teacher and Pupil Consultation

First the teacher consultation is described. This was carried out via interviews with four teachers who had taught English to the target age range of children, and who had varying levels of experience with game creation. The interviews were conducted with the aim of gaining input from teachers to determine whether they felt that the activity had promise for developing writing skills, in line with what was suggested by the literature review in the previous chapter. A further goal was to gather input, based on their knowledge and experiences in the area, on the best approach for supporting the activity.

Next the initial pupil consultation is described. This took the form of a questionnaire given to a class of pupils with some experience of game creation. The aim of this was to examine how pupils think about game creation; the extent to which they enjoy it, what they think they can learn through the activity, and any aspects of the activity they find difficult. Both the teacher and pupil consultations were designed to gather initial input about the requirements for software support, as well as broader implications about the way the activity should be framed.

3.2.1 Teacher Interviews

To inform the overall approach to the research a teacher consultation was set up. I interviewed four teachers, all of whom were female and none of whom had worked at the same school as the others. They had differing levels of experience with technology enhanced learning, and their current job roles varied, but all were trained teachers and had experience of teaching English to

children within the target age range of 11-15 in mixed comprehensive schools. Teachers A and B were teaching English at Key Stage 3 at secondary schools in England, and neither had any experience with game creation tools. Teacher C was teaching the final year group of primary school in Scotland (P7, ages 11-12) and taught subjects across the curriculum but was particularly interested in storytelling and was about to undertake a game creation project (Design Study 1). Teacher D had taught at primary and middle schools in England, with a focus on English and Drama, and at the time of the interview was working as an education advisor with a responsibility for literacy for a local authority in Scotland. Teacher D had extensive experience using the Neverwinter Nights 2 toolset for game creation and at the time of the interview was also employed as an advisor on a research project which made use of the toolset (Adventure Author).

Semi-structured interviews were carried out individually with the teachers using a set of guide questions (see Appendix A.2) based on important issues from the literature review and design considerations. The questions were phrased to avoid jargon and technical terms which the teachers might not be familiar with. They were intended first to bring about discussion of key issues in teaching, and more specifically the teaching of writing and creative writing, with a particular focus on the activities and approaches that impact on motivation and learning. The second aim of the interview plan was to look specifically at game creation and examine what merit the activity could have in relation to the teaching of writing and English skills more generally, but with reference to the existing curricula where possible. Towards the end of the interviews teachers A and B were given a demonstration and invited to try a game creation tool which has been used with a view to developing storytelling skills (the NWN toolset). As Teachers C and D were already familiar with the successor to this tool this step was not necessary.

All teachers gave consent to be interviewed and for the interviews to be audio recorded. The full interview and demonstration recordings were subsequently transcribed verbatim. A thematic analysis was carried out in line with the template analysis approach (King, Cassell and Symon 2004). An initial template of descriptive codes was drawn up to reflect the topics under discussion. This was based on the guide interview questions and areas of interest raised during the literature review. The transcriptions were first hand-coded in line with the initial template, and after a first pass through some additions and alterations were made to the codes to better reflect the interview data. A further pass through the transcriptions was completed to re-code in line with the revised template. Finally some umbrella themes were defined which grouped closely connected sub-themes under one topic, and a summary was produced for each of the top-level themes. This summary is presented in the following sub-sections.

3.2.1.1 *General Challenges in Teaching Writing*

A key challenge raised by teachers A and C in relation to writing was handwriting difficulties. Teacher C commented that “handwriting for them is so difficult, their handwriting is still so messy that they don’t get a lot of satisfaction out of it...It’s kind of, like, a vicious circle – they don’t write because they don’t get any better, and they don’t get any better because they don’t write”. Teacher A believed that some pupils, particularly lower ability boys, actually found it painful to hold a pen.

Teacher A also felt that pupils can find it hard to know how to improve their writing, because proficiency in writing is hard to qualify. She reported being surprised by how much some pupils enjoy activities such as spelling tests, and believed that this is because activities like this are more quantifiable, and there are right and wrong answers. She explained that for many aspects of English and writing in particular it is not possible to give this sort of feedback, as achievement and suggestions for improvement were much less tangible. She also noted that at the higher levels it was hard to give concrete advice on how to improve – something which parents often asked for at parents’ evenings – explaining that it was important for pupils to read widely and learn how to emulate other styles to develop their own writing further.

All teachers talked about the challenges involved in motivating pupils to engage with writing tasks, as discussed further in the following sub-section.

3.2.1.2 *Motivation*

Motivation was considered to be very important to learning by all teachers. The types of motivation discussed included extrinsic and intrinsic motivation, although not in these terms. All teachers talked about five key factors which were relevant to motivation; ownership, activeness, play, feedback and relevance.

On the subject of ownership and choice Teacher D noted “you can come up with the driest part of the curriculum that has to be covered...but if you can give the children responsibilities within that, and choices to make, and decisions to make – that can help enormously”. Teacher A noted that Key Stage 3 pupils, particularly boys, enjoyed activities such as drama, because they could present material of their own choice. Teacher C described the importance of buy-in from pupils, explaining that even with an activity which seemed likely to appeal, its success was dependent on individual pupils making a choice to engage.

Play was mentioned as important by all teachers, both in the form of explicit games such as word games, but also in taking a playful approach to the subject area, Teacher C said “I’ve done a lot of, you know, playing about with colloquialisms and trying to get them, you know,

interested in what they're... collective nouns even, it's like they're playing about with them and having fun with it...".

As mentioned above under multimodality, all teachers felt that making activities relevant to the interests of pupils outside of school, such as films and games, was important. Teacher C felt that building these links to outside interests could help pupils see the point of what they are doing in class. Teacher D also said the same thing, with specific reference to using games in the classroom, saying "I think it fits very importantly with children's culture... and you have to tap into that – they need that!...It jumps the gap that had cavernously opened up... between formal curriculum and children's outside world. And it's lovely to see something that... is helping children to realise that there is a place for their culture, and teachers are recognising that, you know, we can all get something out of it."

Active learning was believed to be motivating and successful by all the teachers interviewed. Teachers A and B found that using game-like activities such as card-sort exercises, word searches or games such as Boggle could be very effective. Teacher B noted that the interactivity experienced when playing games was particularly motivating. When encouraged to talk about whether any tasks were more intrinsically motivating, Teacher C said that she felt that active learning, particularly where there is some physical engagement, was generally more motivating. She also explained that motivating pupils to ask questions was a very important goal for her, and noted that this helps them to "start linking it to what they already know – which is the really important part".

Both teachers A and B noted that some pupils, more commonly girls, enjoyed working on individual writing tasks, but said that all pupils, and particularly boys, tended to enjoy more interactive tasks. Teacher C explained that a mixture between active and more focused independent work was necessary, and described a tension between classroom management and engagement. She found that her pupils could sometimes focus well working quietly and individually with books, but she was not sure that their learning under such situations was of such high quality, saying "although they can be working quietly and focused what they're getting out of it may not be really high-quality. You know? They can work well, but what are they learning? But if they're motivated then they're actively taking more of an interest, it can become a bit of a nightmare classroom management wise, but they might actually get more from it because they're interested".

Teacher A found group-work to be motivating for boys, and noted that boys in particular liked there being an element of competition involved in activities. This teacher described the competitive element as being related to clear feedback and pupils having a quantifiable sense of how well they had done on a test or quiz.

There were a number of related concepts which teachers spoke about when asked about motivation in the classroom. For Teacher B low motivation levels were equated with pupils finding a task or subject difficult. Teacher A spoke about inspiration when asked about motivation, and described how stimuli could be used to support inspiration amongst pupils (discussed further below under Creative Writing). Teacher C discussed motivation in terms of the propensity for hard work, stating that some children are naturally hard working, but others needing bribery (extrinsic motivation) such as the promise of rewards for working.

Teacher A also touched on extrinsic motivation in the form of performance goals. She stated that during Key Stage 3 general motivation levels tended to drop at certain points, with year 8 cited as a particularly low point because there were no exams and pupils started to feel that high school was not as difficult as they first feared. Teacher A explained that if pupils were less motivated they were less engaged with their learning, and also noted that low motivation meant that the teacher had to commit extra time and effort, which was not always possible.

3.2.1.3 *Creative Writing*

Teachers A and B both noted that the national curriculum does not put much emphasis on creative writing. Teacher A said that she mainly used creative writing to underpin other learning, and Teacher C also spoke of the importance of showing how a wide range of targets were being satisfied by any given task. It was noted by all teachers that writing stories was popular with some pupils because it allowed them to write about what they wanted, and to “own” the piece of work. Teacher B stated that she felt like she should be doing more creative writing activities than she did, but pressure to justify activities in terms of curriculum content prevented this.

Teacher D felt that creative writing was an important way of encouraging reflection, and described it as “hugely enriching – it’s a way to become curious about language, it’s a way to become curious about the world... stopping to think – what’s happening here, what’s going on inside my head, how do I feel about it”.

Most creative writing activities described by the four teachers took place in the context of a broader unit of work. All four teachers found stimuli such as images and videos to be useful in supporting creative writing activities. The importance of getting the balance right was stressed; Teacher A stated that overuse of stimuli could prevent pupils from developing their own ideas. She suggested that a video might give them too much to work with, whilst quite imaginative writing responses were often produced when a single still image was used as a stimulus.

Teacher A reiterated her view that Key Stage 3 pupils needed stimulus to produce a piece of creative writing, stating that when given a completely free rein they tend to produce lower quality writing. She noted that heavy structuring of an activity could limit children’s

engagement, but story arcs and storyboarding were seen as a good idea. This teacher did not use them at present, but planned to use them in short-story writing this year to help the pupils plan their stories. She had previously used a 'character grid' which prompted pupils to think more deeply about their characters to ensure they were well-rounded and not based on stereotypes.

In story writing, Teacher A found that girls were more likely to work on character development and descriptions, whereas boys generally wrote more fast-paced stories and were more likely to rely on dialogue and action to move the story forward. This teacher felt that it was important to challenge the pupils to include more of the aspects they would not necessarily include of their own accord.

Understanding story structure was seen as important by all four teachers. Teacher B had looked at narrative structure explicitly with her pupils, but thought that teaching structure explicitly could be less effective than children learning the structures 'organically'. This teacher had taught a unit on superheroes and had set pupils the task of writing their own story in keeping with the genre. She noted that this unit was something she had "found really rewarding to teach actually, because that's free rein for the imaginations. They can use the structure of the story that they've learnt from many superhero stories... but then they can also add their own ideas and imagination to the form of the characters and the story itself and the plot."

All four teachers touched on the idea that it was important for pupils to be set constraints, as they could find it daunting otherwise. Teacher D explained, "offering choices in a framework...in my experience doesn't necessarily inhibit creativity. It, you know, creates a safe environment in which children feel free to explore and experiment."

The teachers stated that writing skills which could be developed through creative writing included a good grasp of vocabulary and literary techniques such as onomatopoeia, simile, and alliteration. Teacher B also noted that creative writing could help pupils to explore original ideas in their own voice, which was something harder to pin down, but relates to use of vocabulary and literary techniques. Specific skills development comments are discussed further in 3.2.1.10.

3.2.1.4 External Representations

When asked whether they found graphical representations to be useful for pupils in writing tasks, teachers A and B stated that tools such as spider diagrams could be motivating and helpful for pupils at the planning stage. Different activities such as drawing maps of the setting for a story and drawing and labelling characters were seen as positive because they were motivating for the pupils and could break up a lesson. Teacher B stated that some children did

not express themselves best in writing tasks, but could still practice skills important to English through different tasks.

Maps of story locations were mentioned by teachers A, C and D as a good way of planning and encouraging pupils to think more deeply about story elements which can lead to greater investment in the task and provide young writers with more to say.

Teacher's A, C and D also talked about illustrations and diagrams acting as a way of encouraging pupils to think in more depth about the writing topic. Teacher D explained two goals behind the setting of related drawing tasks: "a. they make a greater commitment to the piece of writing, because they become more interested in it, they have a greater investment in it, and b. they're better placed to write more richly and more convincingly because they've taken time to step back and you know, look at that particular aspect".

3.2.1.5 *Multimodality*

Multimodality in relation to writing was not explicitly discussed by any of the teachers, although Teacher D made a number of points which were clearly aligned with this theoretical approach. For example, she said of game creation that "there are lovely elements of writing in the fantasy genre that are expressed completely visually in area design...by your choice of creatures and setting and such like...there's a huge amount of 'writing' - in inverted commas - going on in area design that's got nothing to do with words".

Teacher B mentioned gesture and tone of voice as important for communication, but identified this as being specifically relevant to drama. Teacher A had a fairly traditional idea of writing, but felt that media such as films had the power to make older literature more relevant to pupils. Teacher B felt similarly, saying "if you can motivate children through the media that they know and are surrounded by all the time you have a much better chance of educating them than without it". Teachers A and B both wanted to make the point that films were not something which could be used passively, but must be integrated into pupils' learning through supporting activities. From these teachers' comments the implication was that films were a way of promoting engagement rather than something to be studied in their own right as multimodal texts.

Teacher C made some very interesting comments about whether games could be considered 'texts'. She had heard of work by a UK primary school teacher using games from the *Myst* series, and she noted "he's very much used that as a kind of text... this is what we're responding to, and generating lots of things from it in the same way that you would a play or you know, a sequence from a film - you can take so much from it." However, she was much less sure about

the idea that pupils could be considered to be creating a text when building their own computer game, as discussed further in 3.2.1.8.

3.2.1.6 *ICT and Media in English*

Teachers A and B reported that use of ICT facilities was very limited in their schools but believed that computers had good potential for enhancing teaching and learning at Key Stage 3. Teacher A noted that pupils were used to having a screen in front of them at home, explaining that pupils saw no point in starting a piece of coursework on paper as they would eventually be typing it up electronically. As mentioned above, Teacher A found that some pupils, particularly low ability boys, actually found it painful to hold a pen and found it much more natural to use a keyboard.

Teacher D noted that the way ICT was used in English at that time was quite limited. She felt that if pupils were taught to use a computer for writing and editing from a young age, and had access to it, then writing their work using a word processor would be beneficial, but said that currently computers are often used in very unimaginative ways. She explained that “[s]ome teachers feel – we should be using computers in English so we’ll get them to write up their story when it’s finished – which is, you know, a criminal waste of time.” So this teacher believes that it is important to find more progressive ways of using computers within English, above and beyond word processing.

The importance of ICT training was raised by Teacher B. She felt that interactive whiteboards were generally not made the best use of as most teachers she knew were not trained in how to use them interactively.

In line with the discussions around motivation, teachers A and C commented that it was important for them to make activities relevant to pupils, and they believed that media and technology elements could help with this. Teacher C felt that ICT and media links were essential as they helped pupils connect with English activities, saying “I think that their education has to reflect the world around them for it to be relevant to them. So that’s why ICT is... they’re doing it now before they can walk!”.

Teacher B commented that pupils would most likely go on to use writing in the context of ICT at work, so it was important for them to be able to use computers in this way. This highlights the importance that this teacher placed on ensuring that learning in school was relevant to how pupils would use skills in their careers. She commented that “If you look at how English is used in a modern work context it’s used invariably through ICT so I think it’s important for pupils to be able to manipulate and select information on a computer, and use different programs to do that.”

All four teachers believed that the study of different media had an important role to play in secondary-level English, and emphasised the motivational factors of using multimedia. Teacher A stated that anything which had narrative, characters, locations and morals should be relevant to the study of English, and felt that it was a shame that in the twenty-first century other types of media were still not being fully explored.

3.2.1.7 Teachers' Experience with and Opinions on Games

Two teachers had some experience with playing computer games in their spare time. Teacher A played console party games fairly regularly and liked the social aspect. She was familiar with the concept of interactive narratives from 'choose your own adventure' books. She had previously considered getting pupils to write interactive stories because she thought that getting pupils to play each other's games would add invaluable peer interaction and peer marking possibilities which she saw as having great potential. The idea of using games in the classroom was seen as something that would be very motivating for pupils. She suggested that girls might not enjoy the game aspects quite so much, but that they could find ways of making the activity relevant and interesting to them. Teacher C had played action and driving games on consoles when she was younger, but she explained that she felt the need to give them up when her school exams were imminent.

Teacher B did not play games, but was familiar with the idea of interactive stories, and identified computer games as interactive narratives before this idea was expressed in an interview question. She believed that boys would enjoy using a computer to create an interactive story more than they would traditional writing tasks. Teacher D did not play games in her spare time, but was very experienced in using games and other interactive media within a classroom context.

3.2.1.8 Game Creation Tool and Potential Applications

All four teachers noted that creating games should give a good sense of ownership for pupils and reiterated the extent to which links with games and other media helped to demonstrate real-world relevance of classroom activities.

Teachers C and D had an existing knowledge of using game creation to support learning, as Teacher D had been working as a consultant on the Adventure Author project, and Teacher C was at the time of the interview shortly to start using Adventure Author with her own class. Teacher C pointed out that one of the key benefits of pupils creating their own games was that "other kids can go on and play it and really be involved in it in a way... and discuss it and give them peer feedback in a way that they can't really do with the writing. Although, they can read it and give an opinion... but this is a different level! You know?"

Teachers A and B, who were shown the NWN toolset for the first time during the interview, felt that there was clear educational potential for using it within the classroom. Teacher B was particularly impressed by the opportunity for writing interactive conversations and stated that this could help pupils with expression, and understanding that there are different possibilities for a story. Teachers A and B both also noted limitations with the tool they saw demonstrated. Teacher B pointed out that the narratives created were mainly conversation and character based, with no potential for teaching aspects such as writing style and other compositional skills. She felt strongly that it would be a very engaging activity and would encourage pupils to write, but she stated that it would be a stilted form of writing. She did not see potential in the software demonstrated for pupils to learn about endings, beginnings, how to introduce conversations or use descriptions.

All teachers felt that it would be important to situate the game creation activity within a classroom context that made the most of the opportunities afforded and built on the work done whilst using the software. There was a general consensus that the activity needed to be supported for pupils to feel the benefits, with Teacher C explaining “it definitely depends how you deliver it”.

A number of activities which could be used to structure the game creation activity within the curriculum were suggested. These included looking at how games use narrative techniques such as introductory screens and cut scenes, writing the back-story to the characters and making character cards and fact-files with images and descriptions of the characters. It was also suggested that children could practice different writing styles and narrative techniques by creating character diary entries. This could also encourage empathy with the characters. It was suggested that the activity could be placed in the context of creating a real product by asking pupils to design packaging and write the text for the back of the box. This could help encourage a sense of ownership.

Teacher B explicitly stated that the activity would be more beneficial if the children were required to do more writing within the tool. She highlighted the need to achieve a balance between keeping pupils motivated and engaged, and encouraging them to practice certain key writing skills which they might not specifically enjoy. She believed that game making could provide new resources for children to express themselves in English, but held that there was a need for more explicit writing skills practice (essentially, text-generation) to be involved. She believed that this could take place within the context of the game creation environment itself and gave suggestions as to how this might happen.

She suggested an alternative way of creating characters which required pupils to type out descriptions of how they envisaged their characters' appearances. She described a process

whereby the pupils typed in text and were then able to see the visual appearances the system had suggested based on their description. This would require them to hone their descriptive skills to achieve the effect they wanted for their characters. She also noted that this process could be scaffolded to a greater or lesser extent depending on the pupil's ability, with lower ability children having the opportunity to choose from suggested vocabulary options. She also suggested that a method such as this could be used for other parts of the tool, with pupils perhaps typing in a description of the environment in which their game took place, and creating the scenery for their game in this way.

The teachers were also interested in the possibility of children recording their own voices to use for the characters. Teacher A believed that recording voices in this way could improve speaking skills. Using a different tone of voice, varying the volume, and using different vocabulary for different characters could be beneficial skills practice.

All teachers were familiar with the idea of treating a game as a text to be studied to some extent, but not all of them thought of game creation as the process of creating a text. Interestingly, Teacher C agreed emphatically that games could be studied, but was very unsure that creating a game could be regarded as writing a text: "That's a really tricky one for me actually!"

Teacher D, who had been working as consultant on the Adventure Author project, noted that teachers she had worked with felt that their pupils' traditional writing had benefitted. She felt more confident than the other teachers that game creation in itself could count as text creation, and noted that although text is only one among a number of modes within the game, the designer is constantly creating pathways for the player/ reader. She felt strongly that there were audience awareness skills involved, particularly in trying to keep the player/ reader engaged.

3.2.1.9 Curriculum pressures

The tension between curriculum requirements and making learning relevant and engaging for pupils was something touched upon by all the teachers interviewed. Teacher A described how creative writing could be used as a way of supporting engagement, but she explained that she had to use it to underpin things in the curriculum. Teacher C talked explicitly about the pressures of the curriculum, despite the Scottish curriculum being non-compulsory, saying that "you can't afford to do anything that's just achieving one goal."

3.2.1.10 Curriculum-linked skills

One of the aims of this research was to provide targeted interface support for the development of key writing skills. Therefore the teachers were asked to identify skills which could be potentially developed through use of the NWN game creation toolset, and also to suggest additional skills which could be developed if the tool was improved in specific ways.

After being introduced to and experimenting with the NWN toolset, the two teachers who taught in English schools (A and B) were asked to identify which areas, if any, of the Key Stages 3 & 4 National Curriculum Programme of Study for English (DfEE 1999) and the Key Stage 3 National Strategy: Framework for Teaching English (DfEE 2001) could be developed through game creation. Both teachers stated that their departments did not use the National Strategy, and so felt that they did not have enough knowledge to make reference to it. The teachers who were currently working in Scotland (C and D) and were familiar with the NWN2 toolset were asked to comment with reference either to the non-compulsory 5-14 curriculum which was in the process of being phased out (Scottish Office Education and Industry Department (SOEID) 1991) or the incoming Curriculum for Excellence 3-18 (Scottish Executive 2004). Both elected to refer to the older curriculum. The curriculum documents were used as a reference tool in this discussion, and concepts which are outlined in these documents are italicised below.

A key theme in discussions about the skills which could be developed was the importance of the supporting activities and the broader context of a game creation project. For example, Teacher A noted that game creation could be used to develop certain skills “with the right starter and the right plenary”. It was clear that the success of learning tasks is hugely dependent on the methods teachers use to support the activities. Although this research focuses on software support, the broader context in which the tool is used is an important element which is considered further in each of the field studies.

Composition Skills All teachers felt that a variety of composition skills could be developed through the activity of game creation. With reference to the English curriculum teachers A and B pointed to the context of *writing to imagine, explore and entertain*. Both felt that there was potential through the activity to teach *drawing on experience of different fictional forms* in composition, *using imaginative vocabulary and varied linguistic and literary techniques* and *exploiting choice of language and structure to achieve particular effects and appeal to the reader*. The programme of study notes that the variety of narrative structures can include sound and images as well as words. With reference to the Scottish curriculum Teacher C and D pointed to *imaginative writing* and *personal writing* as key areas for consideration. Teacher C felt game creation could act as a stimulus for more traditional writing activities, and that writing development was most likely to happen through these other activities. She described the extent to which pupils could *reflect on experience* in personal writing about the game creation project, as an example of this. Teacher D felt more comfortable with the idea that relevant skills could be developed through the game creation activity itself. She pointed out that writing in character in dialogues could be an example of *personal writing* although it also crosses over with *imaginative writing*.”

Teachers A, B and C stated that the potential for developing use of imaginative vocabulary and choice of language could be increased by including opportunities for using text to a greater extent in creating a game in addition to creating dialogues for the characters. Suggestions for this included activities which were already possible using the toolset such as adding text-based introductions to scenes and creating diaries for the player to read. Teacher C felt that writing descriptions within the game would be a powerful way of supporting skills development, but she noted that there ought to be a way of indicating to pupils that these elements were not optional but necessary, saying “[if] they had to do these things for the game to be completed – you know – it needs that introduction page and or you know - to say these characters are Orcs...and then they’d do the description of what these races are like.”

Teacher B suggested a way that the game creation tool could be altered to better support development of skills in descriptive writing. She proposed that actions such as creating a new character or a scene background could be carried out through typing in text-based descriptions rather than selecting from a visual library of potential characters or backgrounds. Teacher D also felt that working on the back story of character was important, and explained that pupils were more likely to make a commitment to the piece of writing and become more interested in it if they have made a commitment to it with preparatory work.

In the context of writing to inform, explain and describe in the curriculum for England, areas highlighted by teachers A and B included using formal and impersonal language and concise expression and considering what the reader (player) needs to know. In addition to the suggestions above, Teacher B suggested that pupils could develop their use of formal and impersonal language if they wrote in the ‘voice of the game’ to give instructions and information to the player.

It was also observed that skills in the area of writing to persuade, argue and advise such as *anticipating reader (player) reaction* and *using persuasive techniques and rhetorical devices* could be developed through creating games.

Planning and Drafting The *planning, drafting, redrafting and proofreading* section of the curriculum for England was highlighted by Teacher B as relevant, and she noted that the tool gave potential for changes to be made easily, allowing aspects of the game to be refined regularly. Teacher D also referred to *planning, drafting, re-drafting* within the curriculum for Scotland. Teacher B pointed to *the ability to analyse critically their own and others' writing*; something which is supported and encouraged by the peer play-testing which occurs naturally in game creation settings. Teacher C also commented on the potential for peer-assessment, saying “the great thing about the game is that then other kids can go on and play it and really be involved in it in a way that, and discuss it and give them peer feedback, in a way that they can’t

really with the writing. Although, they can read it and give an opinion... but this is a different level!”

Other Writing Skills *Presentation skills*, and *using ICT* were also raised as clearly relevant by teachers A and B and audience awareness skills, including *being sensitive to an unknown audience*, were also highlighted as having potential. Teacher C also spoke about the relevance of considering an audience.

Other English Language Skills The teachers were also asked about any other areas of the curriculum, closely related to writing skills, which could be developed. Teachers A and B both cited the *drama* and *speaking and listening* strands of the curriculum for England as being relevant, with Teacher A specifying that this would be through spin off activities. Teacher C also felt that there was potential for linking the activity with drama. Teachers A and B felt that *language variation skills* were an area that could be developed through writing interactive conversations in different styles according to the characters in question.

Teacher A suggested that the reading attainment target of *understanding the author's craft* could be developed by looking at other games and conventions in the planning stage, stating that children could ‘read’ other computer games. Teacher C also made reference to a project she had heard about where a teacher had treated a commercial game as a text for analysis. Teachers A and B highlighted the *media and moving image* area of the curriculum as very relevant and felt that lots of attainment targets in this area could be addressed through computer game creation. Understanding of *how meanings are changed when texts are adapted to different media* was also highlighted as an area which game creation could help develop.

3.2.1.11 Conclusions of teacher interviews

The teacher interviews gave some very interesting insights into the potential for using game creation to support writing development, as well as the challenges that would be involved.

The challenge of motivating pupils and the importance of this was commented on by all teachers, echoing the literature in this area. Encouraging pupils to take responsibility for learning activities and to feel ownership over pieces of work was highlighted as very important for motivation. Playful activities were mentioned as motivating by all teachers, but this was not limited to games themselves, and included more playful approaches to everyday activities such as card sort exercises. Showing pupils why activities are relevant to them was seen as important, and this was spoken about both through bringing in popular culture elements, and setting authentic tasks. Active learning activities were seen as positive for pupils’ motivation and the quality of learning, but it was clear that there was a perceived tension between classroom management and engagement for some of the teachers.

Creative writing activities were something which all teachers felt had value, particularly for encouraging reflection, developing a personal voice and learning literary techniques. This was highlighted as an activity which is enjoyed by some, but not all pupils. Creative writing was seen as giving opportunities for ownership, but it was also clear that some pupils found the possibilities overwhelming, and all teachers talked about the importance of setting constraints for tasks of this sort, for example, by using an image as inspiration.

Most teachers said they sometimes used drawing and graphical tasks to support creative writing, such as maps of story locations. These were mentioned by three of the teachers as a good way of planning a story and encouraging pupils to think more deeply about story elements.

Multimodality was not explicitly discussed by any of the teachers, although one teacher (with the most experience of game creation) felt quite strongly that creating visual pathways through 3D areas was an activity closely related to writing. Another teacher was comfortable with the idea that game could be treated as a text to be analysed, but was unsure whether she would consider pupils to be creating a text when building their own game. Media and technology elements were generally seen as positive by all teachers, and as having good potential for making curriculum content more relevant to pupils. However, all teachers were clear about the point that media and ICT cannot be used ‘passively’, but must be carefully integrated with supporting activities to aid pupils’ learning.

With a specific focus on game creation using the NWN/NWN2 toolset, all teachers felt there were some very positive opportunities for the development of a range of English skills, including writing skills. However, it was clear that there were many aspects of writing to which game creation is unlikely to be relevant, and all teachers made suggestions about ways in which the toolset could be improved to better support the development of those skills which were potentially relevant.

3.2.2 Pupil Questionnaire

The pupil questionnaire was distributed to pupils at School A during the early stages of Design Study 1. Nineteen pupils (10 boys and 9 girls) who were currently taking part in a game creation project at their school were asked to fill out questionnaires about their experiences with and opinions on the activity. As discussed further in Section 3.3.1, in this context the game creation activity was being used as part of a wider project on fantasy literature. The questionnaire form is shown in Appendix A.3. The pupils’ answers to each question were recorded and analysed. There were four closed questions and seven open-ended questions. The responses to each question were summarised to provide an overview of the answers given.

3.2.2.1 Responses

The pupils were first asked whether they were enjoying the game creation project they were taking part in. All pupils answered yes to this question. The second question asked them to explain the reasons for giving the previous answer. There were six main categories of response to this question. The most popular categories were “it’s fun”, which six of the nineteen responses came under, and “a new experience” which also had six responses. The next most common response category was ownership, which four of the responses made reference to, with comments such as “[y]ou can have your own little world and do what you want”. Three of the responses related to learning, with one pupil noting “[i]t helps you learn about computers”. Two respondents had a pre-existing desire to make games, which they referred to in explaining their enjoyment of the project, and finally one pupil responded “[b]ecause my friends are doing it”.

The third question asked pupils what they found hard about game-making. The most common responses were broad comments on the difficulty of the interface, such as “[t]he software itself is quite complicated” and “you can't find what your [sic] looking for sometimes cause there's so much stuff”. Four pupils said that there were not any elements that they had particular difficulty with, answering “nothing” or “not much”, for example. There were also four pupils who reported having difficulty with writing conversations within the game, and three who cited area design activities as being hard. Finally, two respondents’ answers were categorised as relating to difficulties with writing the storyline for their games.

The fourth question asked pupils to assess whether they were getting better at making games. Seventeen participants answered yes, one wrote ‘kind of’, and the final respondent left this and all subsequent questions blank. The following question asked what things pupils thought they were getting better at, if any. Seven pupils gave answers that were categorised as relating to area design, such as “[b]uilding the environment”. Five pupils gave responses relating to improvement in writing conversations, and two felt they were improving in storyline and fantasy development. Two other pupils felt that they were improving at all aspects of game making. The remaining answers all came under different categories, with one referring to error fixing, another to improvement in game play, and the final respondent saying that they were unsure which aspects they were improving in.

The sixth question asked whether pupils thought that game creation was helping them get better at other things they did at school. Fifteen pupils answered yes to this question, and one wrote on ‘kind of’ as they did with question four. Two answered no, and one did not answer. The following question asked them to say what other things, if any, they were getting better at. Eleven responses came under the overall category of writing, including comments such as “I think I am getting better at fantasy writing” and “[g]etting better at writing stories”. Four

responses contained reference to improvement in computing and ICT skills. Finally, one response referred to an improvement in drawing skills, and another pupil said “[i]t has made my imagination bigger”. Four pupils left a blank response in answer to this question.

The eighth question asked whether pupils enjoyed writing stories. Eight answered yes to this, three responded ‘sometimes’ and seven answered ‘no’, with the remaining respondent leaving the answer blank. The following question asked them to elaborate on their reasons for the previous answer. These were either reasons for enjoying, or reasons for not enjoying writing, depending on their answer. Four respondents gave reasons for enjoying writing that were categorised as relating to ownership, such as “[y]ou can create your own worlds and characters”. One pupil explained that they enjoyed writing because they had “lots of ideas”, and another explained that they sometimes enjoyed writing because they found it easy. Three pupils gave answers categorised as “stuck for ideas” to explain why they did not enjoy the activity, and two others gave a broader explanation that they found writing hard in general. Two respondents said they were unsure why they did not like writing, and one said they did not know why they did like it. Finally, one pupil noted that whether or not they enjoyed writing depended on the genre, and three left the answer space blank.

The ninth question asked what pupils found hard about writing stories. Six answers came under the category of difficulty with ideas generation, for example “[g]etting ideas” and “[t]hinking of the plot”. There were also six answers relating to descriptive writing, such as “I’m not good at describing” and “[y]ou have to put in lots of adjectives”. Four pupils cited punctuation as something they found hard, and two answered that writing hurt their hands. Finally, one respondent stated that there was “[n]othing really much” that they found hard about writing, and two gave no answer.

The tenth and final question asked what pupils felt they learnt from writing stories. Three pupils gave answers relating to general language skills, such as “[d]escribing stuff” and “new words”, two answers mentioned spelling, and two punctuation. Three pupils felt that they learnt nothing through writing stories, and two others said they did not know what they learnt. Two further pupils felt that they learnt so much they could not specify anything, saying “loads” and “[t]housands and billions”. Two respondents gave answers relating to imagination, and one said that they learnt “how to create a good storyline”. Two pupils left their answer blank.

3.2.2.2 Conclusions of pupil questionnaires

These responses indicated good potential for game creation as a learning activity, and a number of pupils specifically felt it was helping their writing skills. All pupils reported enjoying the activity of game creation, with answers most commonly relating to the ‘fun’ nature of the task, or its novelty. However, a number of pupils also referred to the positive feelings of ownership

the task engendered, and some referred to specific learning outcomes. When asked about difficulties they were having some pupils reported problems with aspects of the interface, whilst a number of pupils felt that writing conversations for their game was hard, and a small number cited difficulties with the development of the storyline. Less than half of the pupils surveyed reported that they enjoyed writing stories. A number of those who did enjoy it cited reasons relating to ownership, and a reasonably common reason for not enjoying it was given as problems with ideas generation. This theme was continued with the questions which specifically asked what difficulties pupils had with writing, where the most common response related to being stuck for ideas.

Considered in line with teachers' comments about the importance of pupils feeling ownership over tasks, and the importance of providing constraints for creative writing tasks, these findings suggest potential for a game creation toolset which gives a broad but finite collection of settings and characters to offer an enjoyable alternative to creative writing.

3.2.3 Curriculum Changes

Significantly, both the curriculums for Scotland and England have been subject to change since the interviews were carried out in August 2007 (Teachers A and B) and April 2008 (Teachers C and D). The curriculum for England was revised and whilst the curriculum objectives were streamlined to some extent, the general approach remains the same, with the skills identified here still held to be important. There has been a slight move to recognise the importance of multimodality, with multimodal texts being mentioned specifically with regard to reading, but not in relation to writing (DfE 2007). As discussed in Chapter 2, the curriculum for Scotland has had a more significant overhaul, and now encourages more cross-curricular projects and activities. The language section of the curriculum has a broad all-encompassing definition of text (Scottish Executive 2004), as referred to by Teacher D, but this is still linked more closely to the reading of texts rather than the creation.

3.3 Design Studies Overview

In this section the study settings are described, along with an overview of how the projects progressed and general observations from the studies which had implications for the design of the software support and surrounding support.

3.3.1 Design Study 1 – School A

3.3.1.1 *Setting and participants*

School A was a state funded primary school in East Lothian, Scotland. One primary 7 class (aged 11-12) took part in a game creation project over the course of a six-week period. This study was organised by and run with researchers from the Adventure Author (AA) project, and

involved the use of their augmented version of the NWN2 Toolset. There were 25 pupils in the class, of which 11 were girls and 14 were boys. The class teacher ran the game creation project as part of a larger cross-curricular project on fantasy literature, and asked the pupils to create game worlds and then write a short story based in those worlds at the end of the project. The class spent much of their time on the fantasy project for the six-week period, although there were also regular timetabled slots for maths and physical education.

A suite of ten gaming laptops was lent to the school for the duration of the project by the Adventure Author project. The pupils used the laptops individually according to a rota whilst other classmates worked on additional project tasks set by the teacher, including brainstorming, drawing, craft-work, reading of fantasy novels and vocabulary exercises. Whilst using the laptops pupils sat around two tables in close proximity, and the rest of the class worked in another area of the classroom. Approximately 6 hours was spent using the toolset by each pupil, although this varied due to absence and timetable constraints.

The class teacher led the overall cross-curricular project, whilst researchers from the AA team ran a number of whole-class demonstration sessions and gave advice and guidance on an ad-hoc basis as necessary. The demonstrations showed pupils how to carry out a range of important tasks within the toolset, as well as how to use additional AA support tools such as the conversation writer and an ideas generation tool. For the most part, pupils had free choice of what game making activity to engage in when they used the software, although at the beginning of the project this was guided by the demonstrations given most recently.

I visited the classroom for a one day period near the beginning of the project and a two day period towards the end of the project. On the first visit I gave a demonstration to the class and spent some time giving guidance and looking at the games under creation, and on the second visit I interviewed a group of pupils and carried out some design activities.

3.3.1.2 Data Collection

Observation notes were made on each visit to the class, and additional notes were made available by members of the Adventure Author team who visited on different days. I also collected the games created by pupils during the project, and the stories written by pupils and added to the class blog.

Four pupils were interviewed about their game creation experiences, and four carried out design work in relation to the character creation tool. The interviews were audio-recorded and subsequently transcribed verbatim. The design work is discussed further in section 3.4.4. Additionally, the whole class were asked to fill out a questionnaire on game creation towards the end of the project (see Appendix A.3), although only 18 were present on the day due to

absences and some pupils being called out of class. The questionnaires were filled out on paper and later entered electronically for analysis, and the findings from these have been discussed already in section 3.2.2.

3.3.1.3 *Observations and Commentary*

The class teacher called the project ‘the world builder project’ and saw the game creation task primarily as pupils creating worlds in which their stories could take place. This effectively mirrors the evocative spaces which Jenkins speaks of, although pupils also implemented some of their stories in game with conversations, allowing elements of enacted narrative (Jenkins 2004).

The teacher reported that pupils were excited about the game creation project before it started, and there was a generally positive and enthusiastic atmosphere in the classroom whenever the researchers visited. There was an eagerness amongst most pupils for their turn on the laptops. One child, who the teacher reported had been diagnosed with ADHD, seemed to be less keen on the task and had to leave the classroom on one occasion I visited due to behavioural issues. Aside from this, there were no behaviour problems or signs of boredom or frustration.

As this was a cross-curricular project related to fantasy novels, the teacher had pupils working on a wide range of supporting activities, such as making papier-mâché artefacts related to their story, drama work on portraying emotions and vocabulary exercises relating to the fantasy genre. Effectively the game creation activity was used as one of a number of supporting activities for the project, which culminated in a final writing task – a short story based on the worlds they created in their games and thorough additional activities. These stories were added to the class blog and read out to an audience of parents and teachers on a final presentation day, where the created artefacts were also on display, as well as laptops running some of the games.

Near the beginning of the project, and near the end of the project I spent time observing the pupils working on their games, and observing the teacher working with pupils on related tasks away from the laptops. Whilst offering guidance and support to pupils I also asked them about their stories. Towards the end of the project most pupils had a good idea of what their stories would be. Some had implemented elements from their story in the game world, whilst others had chosen to set their stories before the game began.

The game creation aspect of the project was primarily supported by the literacy specialist and lead investigator on the Adventure Author (AA) project, who gave demonstrations which taught the pupils and the teacher how to achieve various tasks in the toolset. The demonstrations covered designing the 3D landscapes and adding objects and characters from the toolset blueprints, writing conversations and attaching actions, and using Adventure Author tools such

as ideas generation tool ‘Fridge Magnets’ and the peer play testing support tool ‘Comment Cards’. The pupils were not shown how to create internal areas for the games, as the teacher wanted them to focus on creating one setting for their stories, and was concerned about the time available on the laptops.

The overall model of the demonstrations was to introduce one new skill or task at a time in a short demonstration, and then get one group to get straight on with trying out the new skills. The AA team noted that it would have been beneficial for all students to get straight on the laptops after the demonstration, but equipment constraints made this impossible in this setting. They felt it was important to allow young people the freedom to implement their new skills in the way they saw fit, rather than setting specific tasks to be achieved during any given session. Additionally, the literacy specialist also used an example game with strong narrative elements to encourage pupils to think about the narrative elements in their own games.

Peer-play testing of the games took place towards the end of the project, and involved pupils working in pairs and taking it in turns to test each other’s game. Pupils were instructed to watch their tester play through their game without giving them directions or instructions, although they were allowed to answer questions if asked. This allowed observant pupils to gather feedback on the extent to which they were communicating effectively with their player about the game goals. The final stories were relatively short. The sixteen stories uploaded to the class blog had an average of approximately 270 words. All stories made some mention of the setting, and many contained detailed descriptions of the land in which they were set.

As discussed above, all pupils who filled in the questionnaire reported enjoying the project. The teacher sought feedback from the class on the project as a whole through her own evaluation forms, and gave a brief overview of the findings. All pupils said that they enjoyed working on the laptops to create their worlds, and they felt that whilst it would have been better for each pupil to have their own laptop, everyone got a fair turn thanks to the rotation system. Most of the supporting activities the teacher ran were found to be useful by pupils, although many pupils rated story planning exercises as ‘boring’. A number of pupils reported that they would think more about description in their writings after the project, and some pupils said that they had learnt about working with others and working through problems.

3.3.2 Design Study 2 – Workshop A

3.3.2.1 *Setting and participants*

Workshop A took place at the Scottish Storytelling Centre, Edinburgh during a school vacation period. Ten participants aged 12-14 (nine boys and one girl) attended the workshop over 4 days. The workshop was advertised through posters in local school computing departments, and

places were allocated on a first come, first served basis. The workshop ran from 10am to 3pm each day with a 30 minute lunch break and two 15 minute juice breaks.

A suite of ten gaming laptops belonging to the Adventure Author (AA) project were used for the workshop, and the laptops were arranged so that participants sat together on one large rectangular table. Taking into account time spent away from the laptops watching demonstrations and carrying out other related activities, participants spent approximately 10 hours working with the toolset.

The AA Principle Investigator ran the workshop, with support from me and a researcher on the AA project team. We each gave a number of demonstrations showing participants how to carry out the key tasks within the toolset and Adventure Author, and provided on demand support and answers to questions as participants worked on their games throughout the week. Again, participants were free to choose which game making activity to focus on at any given time, although they were encouraged to use particular AA tools at the beginning and end of each day, and the demonstrations shaped activities to some extent. On the third day of the workshop, a professional games designer visited and spoke to participants about working in the games industry as well as giving them general advice on their games.

3.3.2.2 *Data Collection*

Whilst providing support to participants I was able to find out about the games they were creating, gain an understanding about what they were trying to achieve and spot difficulties they had in achieving their goals. I made observation notes over the course of the four days. As I was involved in running the workshop and help was in high demand, these notes were generally written up at the end of the day. All participants were interviewed about their games on the final day of the workshop, and subsequently tested a paper prototype of a tool, as described further in 3.4.5. The semi-structured interview guide can be found in Appendix A.4. All interviews were transcribed verbatim and a number of photographs were taken of the prototype interactions, these were combined with the transcriptions to provide a full account of the interactions.

3.3.2.3 *Observations and Commentary*

The young people attending the workshop all had an interest in games, and were keen on the idea of designing their own (having signed up to take part in the workshop during their school holidays). An initial discussion of which games were favourites of participants, led by the AA Principal Investigator, revealed that few of the participants rated games with strong narratives high on their list. The RPG genre was discussed as typically having more story elements than some other genres of games, and through our demonstrations we encouraged participants to consider how their game conveys narrative and how they could use story to give goals to the player.

On the first two days of the workshop, when most of the demonstrations took place, participants were focused on experimenting with the toolset's capabilities, but by the third day their attentions turned to creating a finished game. At this point attendees started to think more about the storyline of their games. These changes in focus coincided with three things. Firstly, they had learnt the basics of the toolset and there were no more demonstrations to watch. Secondly, we began talking about the peer play testing they would soon be carrying out, which seemed to motivate them to try to create something that would be well-received. Thirdly, the professional game designer visited in the afternoon of the second day and encouraged the young designers to think in more detail about how audiences would perceive their game. He encouraged them to have a strong idea of what their game should be like, and made particular reference to the importance of knowing what the different characters are like when writing conversations. Participants seemed spurred on by his advice and appeared to take his expert status seriously.

One participant, who had been diagnosed with an autism spectrum disorder, was very quiet on the first day of the workshop and elected not to return for the rest of the week. A participant from the workshop waiting list joined the group in his place on the second day, and quickly caught up with the other workshop attendees.

There were some minor behavioural issues, with one participant going to lengths to annoy the participants around him, primarily by including mildly offensive jokes in his game conversations and reading them out-loud. However, after a request to stop from the workshop helpers, he settled down and the atmosphere was generally good for the rest of the workshop. Participants were generally quite able, and quickly picked up on how to carry out the basic tasks within the toolset. There were some interesting examples of participants showing each other how to achieve a certain effect or behaviour within the toolset, and there were some cases of a particular idea travelling quickly around the workshop room, the "brushfire effect" previously observed by Good and Robertson (2006b).

Participants seemed slightly reluctant to carry out some of the stand-alone Adventure Author activities which we asked them to do at the beginning and end of each day, namely, planning their workload and keeping track of their evolving ideas for the game. My sense was that some participants saw these tasks as disconnected from the main game creation activity, which they were enthused by, and felt that they were taking time away from work in the toolset. I noticed a tendency for some participants to skip over these tasks as quickly as possible without appearing to give them any thought or attention.

I interviewed each participant on the final day of the workshop as part of a design activity. The design element, in relation to an augmented map view, is discussed in section 3.4.5. I asked participants to explain their game storylines to me, and show me where different events took

place using the toolset map. The extent to which participants focused on narrative varied. Some were clearly less interested in this aspect than others, but all had included some narrative elements in their game.

All participants had made use of conversations to convey narrative elements. In some cases these were well integrated into other aspects of the game and visual elements such as area design were used to evoke the setting of the story and guide the player. A number of participants had elements in their games about which they seemed unsure of the purpose. For example, after explaining his main story line one attendee showed me another area of which he was particularly proud of the design, but he was not sure how it fitted in with the other elements of the game. In other cases, participants had a very clear idea about how the overall narrative hung together, but when I asked how some of the ideas would be communicated to the player they had not thought about this. I got the impression that some of the designers were more focused on telling a story for themselves, and had not been keeping the perspective of the player in mind. However, there were also time limits in play, and most designers described tasks that were still ‘to do’ in the games.

To some extent, the experimental approach taken in the first two days meant that participants had started thinking about level design before they had thought about the setting and story of their game. This free-exploration approach is intended to encourage creativity and allows young designers to get a sense of what is possible in the toolset before getting their heart set on a character which has an appearance that is not possible using the available art resources. However, this approach may also make it hard to integrate all the work that had been carried out in the toolset into a coherent world for the player to explore.

3.3.3 Design Study 3 – School B

3.3.3.1 *Setting and participants*

School B was a state funded secondary school in East Sussex, England. Three year 7 classes (aged 11-12) took part in a game creation project over the course of one half-term lasting 7 weeks. This study was organised and run in conjunction with researchers from the Flip project and involved use of the NWN2 toolset in an out-of-the-box state. 78 pupils took part in the project as part of their ICT lessons. The three classes were made up as follows: class X had 24 pupils (11 girls and 13 boys), class Y had 27 pupils (13 girls and 14 boys) and class Z had 27 pupils (13 girls and 14 boys).

The project took place in the final half-term of the school year, and each class had approximately ten 50 minute lessons over the course of the seven weeks due to a bi-weekly timetable and some timetable disruption from end-of-term events. The games were created in an

ICT suite on the school's own computing equipment, although it was necessary for the Flip project to fund an upgrade to the machine's graphics cards so that they met the minimum requirements to run the game creation software. The ICT suite was arranged so that pupils sat around the edge of the room to work at the computers which were positioned against the walls.

I led the lessons in conjunction with other members of the Flip project team, whilst the class teacher took on a supporting role and focused on behaviour management. Towards the end of the term the teacher was able to field questions from pupils to a greater extent as his knowledge of the software and confidence grew.

Other members of the Flip project team and I gave a number of demonstrations on a projector screen which showed pupils how to carry out a range of important tasks within the toolset. Pupils had free choice of which game-making activities to engage in when they used the software, although at the beginning of the project this was guided by the demonstrations given most recently.

3.3.3.2 Data Collection

Other members of the Flip team and I made notes on key events taking place within the classroom where possible, although we were in heavy demand to give advice and help to the large class groups.

Twelve children took part in targeted design activities towards the end of the game creation project. These took the form of individual design activities and a short focus group. Materials used in the design study are shown in Appendix A.5 Audio recordings were made of all design sessions and these were transcribed verbatim. Photographs were taken of design prototypes and incorporated into the transcriptions where appropriate.

3.3.3.3 Observations and Commentary

A key goal of this design study was to observe pupils creating games in a full class setting, as the previous school had operated an unusual setup with only 10 pupils working on the laptops at once.

In general pupils were excited about the project and continued to show enthusiasm throughout the half-term, although towards the end (nearing the summer holidays) there was some restlessness. The class teacher saw the project as an addition to the curriculum focused work, and in preparation for the project he had ensured that he had 'ticked off' all essential elements of the curriculum with these classes in the preceding year. He expressed an interest in using game creation as a way of teaching pupils about specifying control in software, and we

highlighted the extent to which specifying behaviours for characters and objects could involve these elements.

In an introductory session we introduced the project and the toolset, and gave pupils the opportunity to play an example game created with the toolset. The example game had strong narrative elements. Pupils were told that their game should have a storyline, and some form of quest or goal for the player to achieve. We gave demonstrations on the standard toolset activities, and included narrative elements which ran across the demonstrations connecting to a broader story where possible. We also provided worksheets which were handed out to pupils after the demonstrations which showed screenshots and step-by-step instructions. Despite this, we had a large number of pupils asking us to repeat the demonstrations for them in each session. With numbers approaching 30 in each class and a projector at one end of the classroom it was clear that not everyone was able to follow the demonstrations.

With the much larger class sizes, and all pupils working on game creation at the same time, this context was very different from that of School A in Design Study 1. There was high demand for help, with a near constant stream of hands in the air for each of the researcher's help. The bi-weekly timetable meant that lessons were slightly irregular, and classes could go for up to a fortnight without a lesson in some cases. There was some disruptive behaviour from pupils across the three classes, but the teacher was experienced in behaviour management and quickly eliminated disturbances or asked the pupils in question to leave the room and report to the school's central 'behaviour management unit'.

There were some cases of pupils helping each other and passing on knowledge, although they were encouraged not to leave their seats as far as possible, and the class teacher tended to send pupils back to their own computer if he spotted them standing and looking over someone else's shoulder. In some cases within a block of 3 or 4 pupils there was one who quickly became known as the expert, and fielded enquiries from those nearby pupils.

Twelve children took part in design activities towards the end of the game creation project, as discussed further in sections 3.4.5 and 3.4.6.

Towards the end of the project the class teacher encouraged pupils to concentrate on creating their final game, and gave them some specific directions as to what the games ought to include, expressed as questions to which they should be able to answer yes. After the session he reiterated these for me as:

- 1) Is there a quest set up?
- 2) Are there conversations?
- 3) Are there actions linked to conversations?

- 4) Does the game give a reasonable level of challenge? (Not too simple but not impossible due to too many hostile characters.)

He explained that marks would be assigned based on how many of these points were satisfied. These points were intended to simplify the task of marking a complex game, which the teacher expected to be incredibly time consuming. They do not focus on the quality of elements such as conversations or quests, but on the extent to which they are functional, due to the ICT curriculum focus in this project.

In the final sessions the peer play-testing was carried out. This encouraged pupils to reflect more on how the players would understand their game and the extent to which they could follow the instructions and more subtle guidance given. I and the other researchers agreed afterwards that it would have been valuable to have done the play testing a few sessions earlier when there was still time for improvements to be made.

3.3.4 Design Study 4 – Workshop B

3.3.4.1 *Setting and participants*

Twelve young people aged 11-15 took part in a game-making workshop over the course of 5 days during school summer holidays. The workshop was advertised in a ‘Summer Fun’ brochure published by the local authority, and took place on the University of Sussex campus. All participants were male. Places were allocated on a first come, first served basis, and the workshop was oversubscribed with a long waiting list. Each day the workshop ran from 10am to 3pm, with 45 minute allocated for lunch.

This study was organised and run in conjunction with researchers from the Flip project and involved use of NWN2 toolset with the Adventure Author plugin. Participants worked on laptops belonging to Sussex University. On the first day attendees were asked to play an introductory module to give them an idea of the sort of game which could be created using the toolset. The introductory game had a strong narrative with conversations, an evocative area as well as some combat situations integrated into the story.

Participants worked at tables around the outside of a large room with whiteboard walls, and from the second day onwards they were asked to use the whiteboards to draw diagrams representing the story of their game. On the final day of the workshop participants were asked to create a cover for their game in the form of a DVD case inlay using a template (shown in Appendix A.6). At the end of the workshop, participants took away a copy of their module and the game software in a case with their design inserted.

3.3.4.2 Data Collection

Other members of the Flip team and I made notes on key events taking place within the workshop where possible. Participants were interviewed on the final day of the workshop. They were asked about their experiences with the toolset, and the additional activities of drawing diagrams to aid their story planning and creating the game box packaging. The guide questions for this interview are shown in Appendix A.7. The interviews were audio recorded and transcribed verbatim.

3.3.4.3 Observations and Commentary

A key goal of this design study was to examine the role of supporting activities such as narrative planning and creating game box packaging. The narrative planning work also contributed to the design of the branching narrative representation tool, as discussed further in section 3.4.6.

At the beginning of the workshop, participants were told that their game should have a storyline, and the introductory game they played had strong narrative elements. Participants all appeared to be very motivated by the game creation activity and were keen to maximise their time on the game creation activity, with a number of participants turning up early and all participants asking to return to the workshop room before the allocated lunch break was over.

In general, participants found it easy to learn the toolset basics, although the youngest participant, and another participant who missed a day of the workshop due to illness, needed slightly more help. Again, a reasonable number of participants asked to be reminded about content already covered in demonstrations, and an area transitions demo had to be repeated.

Due to the room layout (drop-down tables around the edges which could not be moved), participants were sat two to a table, with some tables at a distance from other table clusters. This may have had some effect on sharing behaviours, as there seemed to be fewer instances of ideas spreading round the room than in Workshop A. However, there were some examples of localised idea sharing and pairs sat on the same table providing help and guidance to each other. I also witnessed some conversations about game ideas which seemed to be sparked by the narrative diagrams on the large whiteboards. These made participants' ideas quite visible, and after drawing their own some participants had a look at the diagrams of those near to them and asked questions or commented on them.

Participants were keen to create their game box packaging, and in end of week interviews all said they enjoyed the activity. The fact that they were able to take home a self-packaged copy of their game and the NWN2 software may have had added an extra motivational factor, which would not necessarily be present in a school setting when the task might be seen as less authentic if they were not carrying it out in preparation for taking the software home with them.

3.4 Narrative Threads Design

The design work described so far has focused on the supporting activities around the game creation task, but indications from previous work, backed up by observations from the design studies, suggested that the toolset itself could be improved with a view to supporting the development of writing skills through narrative-based games authoring.

3.4.1 Design Model for Representational Support

A design model which offers guidance on directing learner attention to desired aspects of a task through foregrounding and backgrounding specific elements with representational choices was developed, based on a synthesis of the representational theory described in section 2.4.2. The model is presented in full in (Howland, du Boulay and Good 2009).

The key recommendations of the model are that interface representations should allow users to carry out subtasks unrelated to learning goals quickly and simply without need for reflective cognition (Norman 1993), whilst subtasks important to learning goals should be carried out thoughtfully and carefully, using reflective cognition. The model states that representational support for complex tasks should allow learners to avoid cognitive overload by storing intermediate results externally (Mayer and Moreno 2003), should support re-use of learner created elements

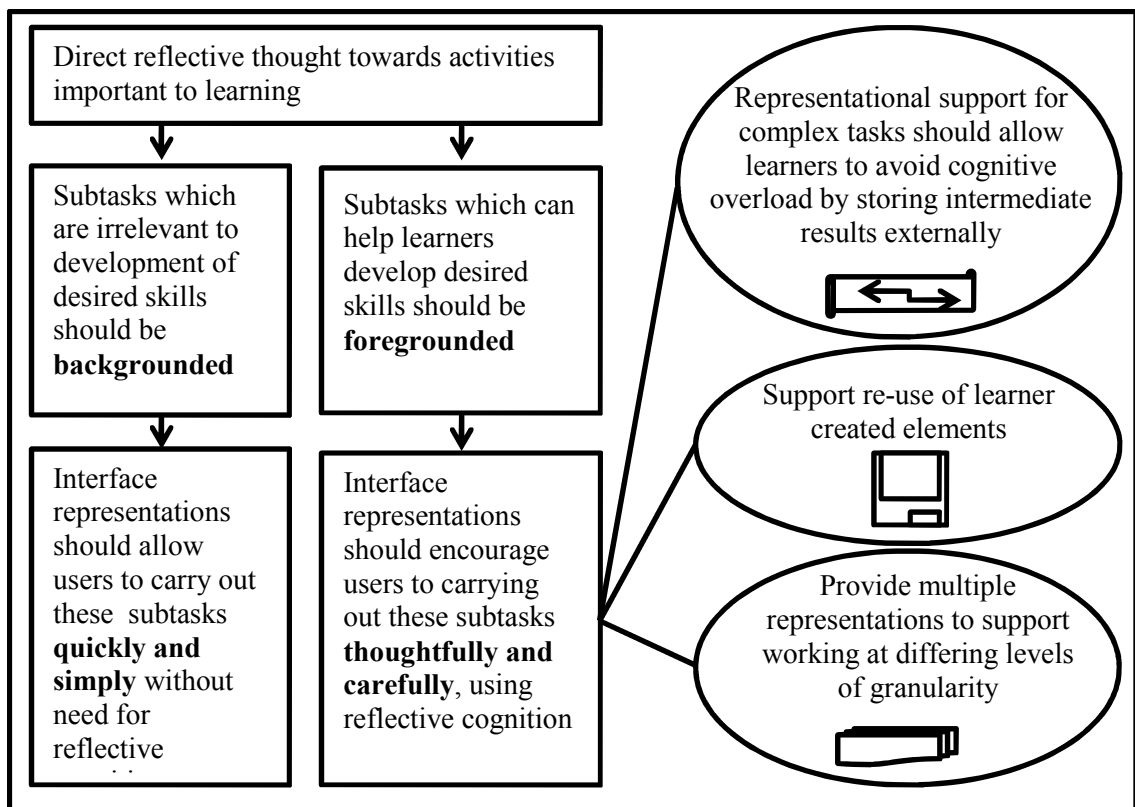


Figure 3.1: Design Model for Representational Support

The central tenet is that extensive reflective thought should be applied by the learners to the right activities. A game creation interface which made the task of saving the game into a reflective activity that required deep thought would be unsuccessful (unless the aim was to teach about the underlying process of writing a game file to disk). Similarly a complex scripting language is an undesirable way of creating in-game events (unless the aim is to teach coding skills) (Howland, Good and Robertson 2007). As the aim here is to develop writing skills through multimodal narrative creation, the interface should encourage deep reflective thought when it involves the practice and development of those skills. Other aspects of game creation should be carried out easily through selection to avoid distraction and unnecessary cognitive effort. Selected theories and aspects of the design model are applied and explained in greater detail in the following sections, with reference to specific design decisions.

3.4.2 Evaluation of Existing Toolset Interface

3.4.2.1 Toolset Overview

As discussed in section 2.3.4, a decision was made to design a suite of plugins for the *NWN2* toolset, in line with the approach taken by the Adventure Author project. *NWN2* is a computer role-playing game (RPG), in which players explore a large fantasy world and take part in a dramatic interactive story, with their own choices having an effect on how the plot progresses. The game is part of the *Dungeons & Dragons* franchise, a series of ‘medieval fantasy’ RPGs. Included in the *NWN2* software package is the Electron Toolset: a game-development application which was used by the developers, Obsidian Entertainment, to build the game itself. This means that, in addition to playing through the included game, users can go on to build their own video games using the developers’ tools and art resources to design new 3D worlds and adventures. These user-created games feature new plots, dialogues, locations and challenges, but retain the same high-quality graphics and complex game mechanics one would expect from a commercial product.

The key in-game elements and objects which novice designers can create are summarised below:

Areas: These are the 3D areas which the player can travel through within a game. A game can have multiple areas, and these can be connected up through doors, triggers or scripted item interactions, as described below. The player must start within one area, at a location specified by the designer.

Creatures: This is the toolset’s term for the characters within a game. These can have greatly varying levels of importance and interaction potential. Designers can create a complex conversation for a character and spend time customising their appearance and behaviours using

a properties window, or they can include a cluster of identical characters which act as extras, serving only to add to the atmosphere of an area.

Placeable Objects: These are objects which make up the scenery of an area, and they can also perform interactive functions causing events and actions to happen when a player interacts with them. These can be very large, such as a huge castle, or very small, such as a moss covered stone on the ground.

Items: These are objects which can be carried in the player's inventory, and in some cases used by the player to some effect. These can be placed within an area like placeables, but they appear as an item bag, and can only be interacted with by being picked up. Items include things such as weapons and armour which can be equipped by the player and used in combat situations, things such as books which can give the author information on examination, and other usable artefacts such as scrolls and potions.

Doors: Doors are essentially a special type of placeable which can be opened, and if properly configured can be entered, leading the player to transition to a different area.

Triggers: Triggers consist of a polygon drawn on the floor of an area, which can cause actions to be carried out when the player enters them.

Waypoints: Waypoints are objects which appear invisible within the game, but which are used by designers to specify locations where events and actions should take place.

Sound Effects: Sound effects can be placed within an area to give background effects ranging from birdsong to people crying out for help.

Placed Effects: These visual effects can be placed within an area and give effects such as sunlight shining on to the ground or a fire burning in whichever location they are placed.

The key in-game events and actions which the designer can create for their games are:

Conversations: Designers can write interactive conversations for the player to have with the characters in the game. Each character can have only one conversation, but the designer can set up conditions for certain branches of conversations so that the lines a character says can change depending on what point of the game the player has reached.

Scripted Events: These are events which override the default inbuilt behaviours of characters and objects. By default certain behaviours are scripted, but these can be changed and/or added to by the designer specifying new behaviours which should be carried out in certain

circumstances. A specially designed visual scripting language, Flip, makes this activity possible for designers of a young age without programming skills.

Area Transitions: These cause the player to be transported from one in-game area to another, and they can be triggered by a player entering a door, entering a trigger, or using an item or placeable object.

Item Acquisition: Players can pick up items by clicking on them, resulting in them appearing in the player's inventory.

Combat: Players can engage in combat with other characters. Sometimes this will happen automatically, as the inbuilt behaviour of hostile creatures is to attack the player as soon as they see her. The player can also start the attack by clicking on a character to attack them whilst still at a distance, or alternatively a fight can be triggered through a scripted event (commonly, when a conversation line is said that offends the other character).

Although there are many complexities to working with this toolset, around five minutes of instruction is enough to empower users to begin independently working on their own games, complete with interactive conversations, 3D landscapes, rivers, trees, buildings, characters, and other points of interest. As such, unlike most game-based programming environments such as AgentSheets (Repenning, Ioannidou and Zola 2000), Scratch (Maloney, Kafai, Resnick et al. 2008) and Alice (Kelleher, Cosgrove, Culyba et al. 2002), including those designed more specifically to support storytelling (Kelleher and Pausch 2007), it is not necessary to have programming or other technical skills in order to create something meaningful and impressive. Instead, users are able to explore the possibilities of the toolset, and use it to build something which appeals to their own sensibilities and which they feel ownership over, approaching game building first and foremost as a creative task.

This initially shallow learning curve is invaluable for motivation and gives users the confidence to persevere with the activity. When pupils do eventually need to engage with programming in order to create more complex behaviours for characters and objects within their game, a visual programming language specifically designed for young people is available (Good 2011).

I chose to use the NWN2 toolset because it provides a way for young people to create their own games with commercial quality 3D graphics, has a good plugin architecture, and because tools to support other key aspects of game creation were either already available or being developed for this toolset (Robertson and Nicholson 2007; Good 2011). However, in repurposing a commercial tool in this way, and based on my previous experiences with the tool I was aware that there were likely to be elements which were less than supportive of the specific goal of supporting narrative-based game creation with a view to improving writing skills. Furthermore,

the design model drawn from the synthesis of literature and early inputs from classroom design work described at a broad level the interface support which would be required to meet this goal.

Therefore, the next stage in the design of the supporting tools was to evaluate the NWN2 toolset interface against the design model for representational support, and the narrative theory established as most appropriate to narrative-based games in section 2.3.2, Chatman's 'story and discourse' model of narrative structure (Chatman 1978).

3.4.2.2 Assessment of Toolset Support

In keeping with most game authoring tools, the NWN2 toolset interface centres on a 3D area view, as can be seen in Figure 3.2. The inbuilt mechanisms and representations in the NWN2 toolset encourage users to focus on 3D area design, whilst the storyline being developed is invisible. This is most evident in two key areas: in the creation of characters and other game objects, and in the overall visual representation of the game.

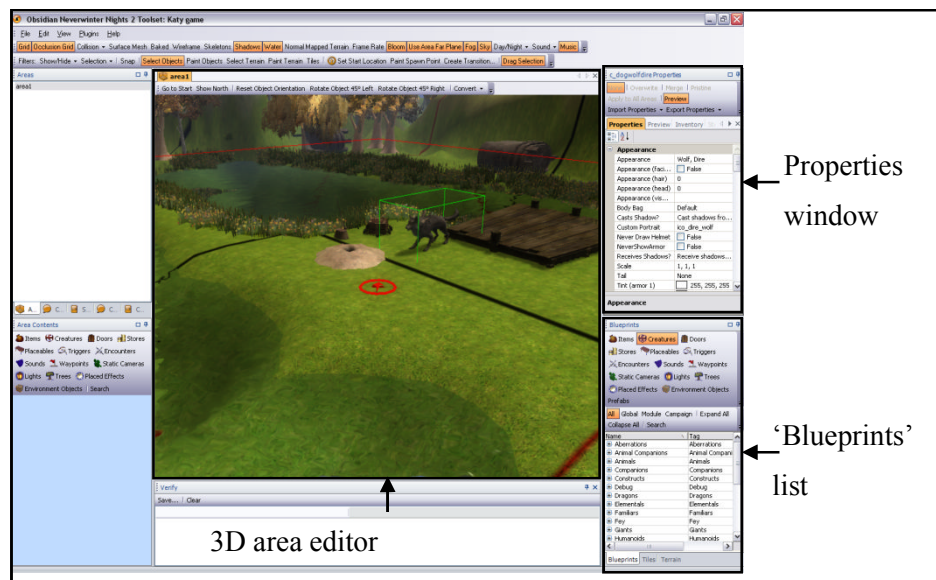


Figure 3.2: Neverwinter Nights 2 Toolset Interface

Character and Object Creation. Following Chatman's theory of narrative, the 'story exists' in a game narrative are primarily implemented through the characters and objects within the game. The toolset contains a number of 'blueprints' or readymade versions of characters, objects and scenery items. The inbuilt method of character creation involves users clicking on a name in the blueprints list and moving the mouse into the 3D area editor to see a 3D representation of their chosen character. They can then either place that character somewhere in the world or cancel the operation and choose another blueprint to preview. After the user creates a character they can open a properties window with over a hundred editable fields and customise the character. However, important fields (in the sense that they affect the character's interactions with other characters) such as those which define traits, skills and the character's

disposition towards the player are not salient amongst a variety of obscure fields which users are unlikely to understand or want to change. There is no support for the important storytelling task of defining characters' personalities; the focus is on the character properties which are relevant to the game engine. The process is the same for creation of other in-game objects.

This drag-and-drop based interaction method encourages a habit of adding multiple readymade characters into a game under creation, with elements sometimes left in the game simply by default. Since characters and objects are the key underlying components of a game-narrative, this unreflective approach is not beneficial. It can also encourage young people to add purely functional characters which have a gameplay role (such as increasing challenge) but no relation to the plot.

Visual Representation of Game. In the existing toolset interface the only visual representation of the game under creation is a 3D area view, which shows the level the designer is currently working on. The objects added to the game (representing story existents) are visible, but there is nothing to indicate whether a given object has a crucial role in the story (performing at least one plot-significant action and thus being a 'character' under Chatman's definition), or has simply been added as scenery (an element of setting). Similarly, there is no indication of where story events will take place within the game areas. There are lists of conversations and scripts which the designer has written, and lists of character and object properties which can be used to deduce potential events are available, but none of this information is connected to the visual representation in any way.

There are no visual representations of the underlying narrative events (actions and happenings), or of the structure of narrative transmission. A journal editor is provided, which allows quest outcomes to be reflected through the player's in-game journal, but it does not give a visual representation of the overall game narrative, and it is hard for young designers to use as it requires them to keep track of the numerical variables which represent different plot states. At present, attempting to consider the branching plot of a game involves the user keeping higher-level ideas about the narrative structure in their mind.

This lack of representation of story existents and events could potentially cause users to focus on the areas which are better supported by interface representations, as is reflected in the large amount of time given to visual area design according to participant estimates at previous workshops (Robertson and Good 2005).

3.4.3 Tools Categories

Key areas for improvement in storytelling support were identified, based on the above assessment of the existing interface provision, and input from the Adventure Author team drawn

from their experiences with the toolset. To prevent the creative process from being interrupted, and encourage young people to think of additional narrative support activities as being integral to the game creation process it was decided that all additional support should be integrated into the toolset interface.

It was determined that the required functionality would best be met through three separate tool categories:

1. **Character and object creation tools** with associated visual representations: To scaffold character and object creation.
2. **Augmented 3D map view showing story event locations**: To show where important plot events are located on the map.
3. **Branching narrative diagramming tool**: To represent the high level plot structure of the game to the user.

The tools are separate but interconnected, and are part of an integrated approach to supporting narrative development by providing representations of the narrative under creation. Each tool was designed in an iterative way with input from theory and existing work, and participatory design activities with children involving various forms of lo-fidelity prototyping. The work with children was carried out in school and workshop settings. Design activities are described in the following sub-sections, and final design decisions are explained in the system description in Chapter 4.

3.4.4 Character and object creation tools with associated visual representations

Theoretical Background. Characters and items of setting are key underlying elements of story content. In Chatman's model of narrative structure they are known as story existents, and are also the source of all events within a story (Chatman 1978).

As discussed in section 2.4, Norman distinguishes between experiential and reflective cognition (Norman 1993). Experiential cognition does not require deep thought and is reactive and event driven, with automatic reactions following from input. Reflective cognition tends to be slower and more laborious, and requires much deeper thought.

Choice of representation and means of interaction can completely alter the mode of cognition used in a task. Svendsen (1991) concluded that whilst direct manipulation interfaces can be very user-friendly they can hinder problem solving if they are supportive of unreflective action.

Adopted Approach. Dragging a generic character or object into the game world, as users do with the existing interface, encourages a reactive approach to adding characters and objects.

Often, young users of the toolset drag in a number of characters seemingly without thought about how they fit into the game-narrative. To address this issue I decided to create a set of wizard tools which guide the user through the creation processes, uniting the previously separate activities of adding an object and editing its properties. In line with the design model and underlining theory, the new creator tools should encourage reflective cognition when users are creating characters and objects which are important to the story line.

Participatory Design. During Design Study 1 four pupils (two girls and two boys, aged 11-12) who had been using the NWN2 toolset part of the fantasy writing project, were asked to build a paper prototype of a new tool which would help them to create more interesting characters for their stories. They were given an example paper prototype of a tool they had used in software form to help them understand what a paper prototype was, and shown some very simple examples of what a character creation tool might look like. Care was taken to provide a range of designs to avoid the ideas simply being parroted back in their own designs. The design sessions were audio recorded, observation notes were made and photographs were taken.

The prototypes created by the participants, as shown in Figure 3.3, were analysed along with transcripts of the activities and additional interviews with the children. A number of key themes which gave suggestions for important design characteristics were identified.

The designs created by the children were mainly based around physical appearances, with options given for customising characters in fine detail. For the girls, this involved having numerous noses and other facial features to choose between, while for the boys, this tended to revolve around combat settings such as strength, weapons carried, and for one boy, setting the amount of body hair and length of forearms!

Personality and the back story of characters were mentioned as important in interviews, but did not feature strongly in the designs created. It appeared that target users were not so interested in the personality of the characters because there was no clear outcome from typing a description of this sort. When it was not obvious how an element would make a difference in the game, participants reported that they skipped straight past it. When setting an appearance, users were receiving visible feedback based on their choice, but writing about a character's personality did not have any noticeable effect on their game (visible or otherwise). A number of comments made by both the boys and the girls reflected the importance of options in a creator tool making a difference in the game. The girls explained that they just picked 'any' for character settings which did not seem to make a difference. The boys also said that character-related settings should "make a difference to how you play". This indicates that without feedback or an understanding of how certain options will have a noticeable effect on the character they are likely to skip through an item without giving it much thought.

Another aspect which caused confusion was the ‘dungeons and dragons’ genre specific terminology used to describe some of the character traits; ‘dexterity’ was held up as a particular example of something which seemed meaningless to the participants. The boys liked the idea of having the whole tool on a single view, and explained that it was hard to remember where options were if they had to switch between screens using ‘next’ and ‘back’ buttons.

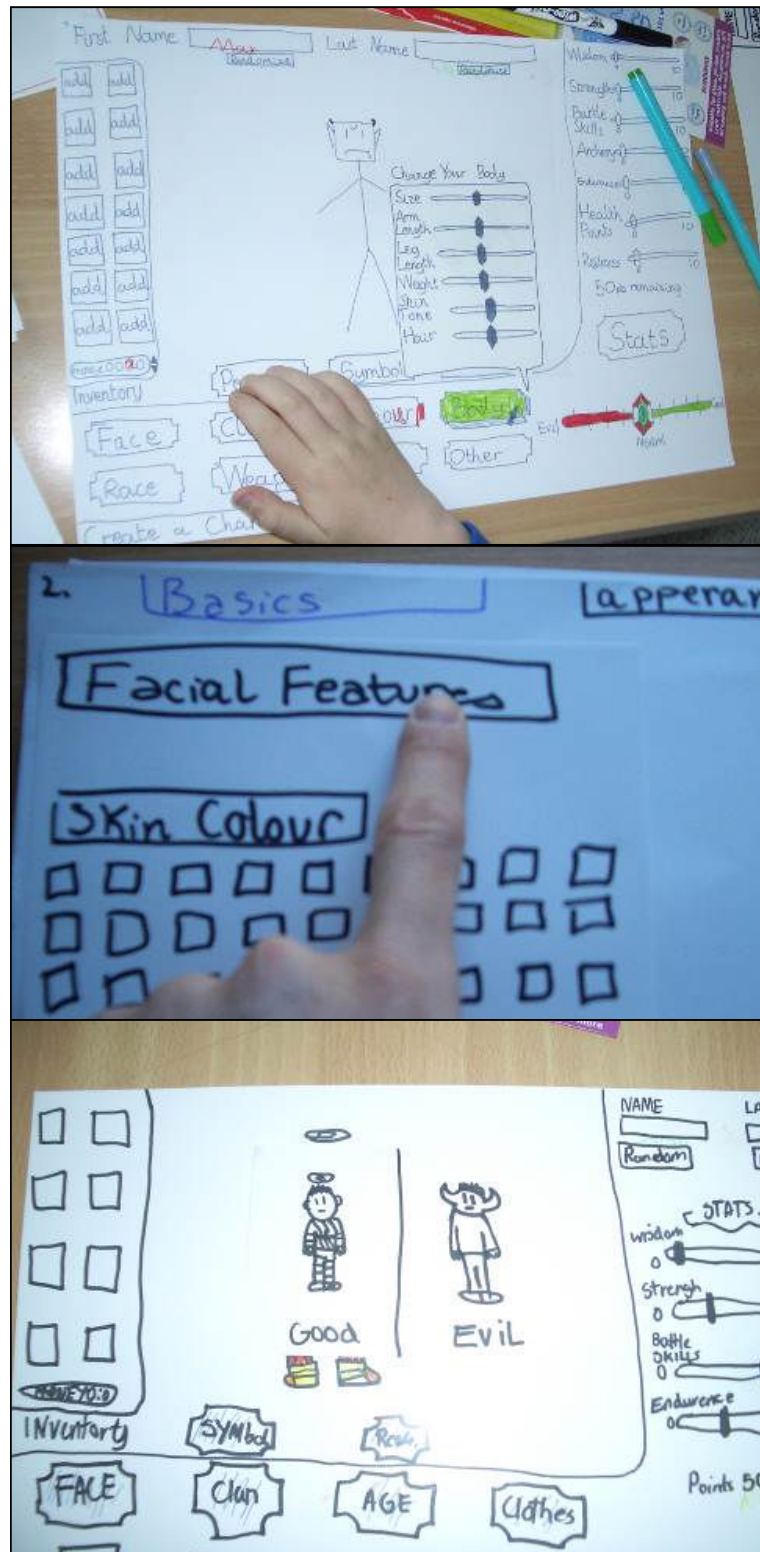


Figure 3.3: Participants' paper prototype designs for character creator tools

Participants' design work, ideas and preferences were fed in to the design of the final character and object creator tools, which are explained fully in the following chapter.

3.4.5 Augmented 3D map view showing story events

Theoretical Background. Events are the other key component of story content, along with story existents, and always involve a story existent either as an agent or patient of the event (Chatman 1978).

As discussed in section 2.4, the match-mismatch hypothesis (Gilmore and Green 1984) states that where a representation highlights a certain type of information, tasks using that type of information will be easier to perform than those requiring other types of information. Where required information is implicit in a representation and needs to be inferred, the task will be harder than if the information were presented explicitly.

Adopted Approach. The task of creating an interactive digital story in the form of a game is not currently well supported because one aspect of the task, the visual design of the 3D areas, is fully represented while other aspects important to the story, such as how a character will behave towards the player, or whether an object can be interacted with meaningfully, are invisible. In an attempt to tackle this problem, I decided to provide a representation of the game areas which showed where important story events (kernels) could take place within the game world. Since events are associated with specific story existents, these will provide the location information, whilst their traits, associated conversations and custom scripts will reveal the potential event(s).

Tools designed to support the creation of virtual reality environments have found that providing simplified floor plans of 3D environments which show the location of objects can be useful for debugging and design purposes (Coleburne, Rodden and Palfreyman 1995; Winterbottom, Blake and Gain). In this design context, the decision was made to augment the existing 3D representation to show the location and type of story events as well as the visual appearance. This avoided adding an additional representation, which was beneficial because working with multiple coordinated representations can present challenges for users (Ainsworth 1999).

The augmentation of the existing representation had the further benefit of ensuring that users were more likely to use the story view map, as it would be integrated seamlessly into an existing essential display. The approach allows some upfront debugging of story existents, as information about their in-game behaviours will be revealed at design time. This could help to mitigate the awkward feedback loop involved in testing the game under creation and making revisions; a laborious process which requires the user to save the game, exit the toolset, and launch the game separately.

Participatory Design. On the last day of Design Study 2, all ten workshop participants (aged 12-14, nine boys and one girl) took part in a design activity. The study aim was to gather further information about the requirements for the augmented map view through targeted interviews and paper prototype activities with the participants.

A series of icons were designed to represent different game objects which were likely to have relevance to the plot of a game, these are shown in Appendix A.4. There were icons for hostile characters, friendly characters, important items, conversations and transitions to other areas. These were used in conjunction with a sheet of acetate with a cardboard surround which allowed us to safely ask participants to place the icons on top of their 3D area views without risking damage to the laptop screens!

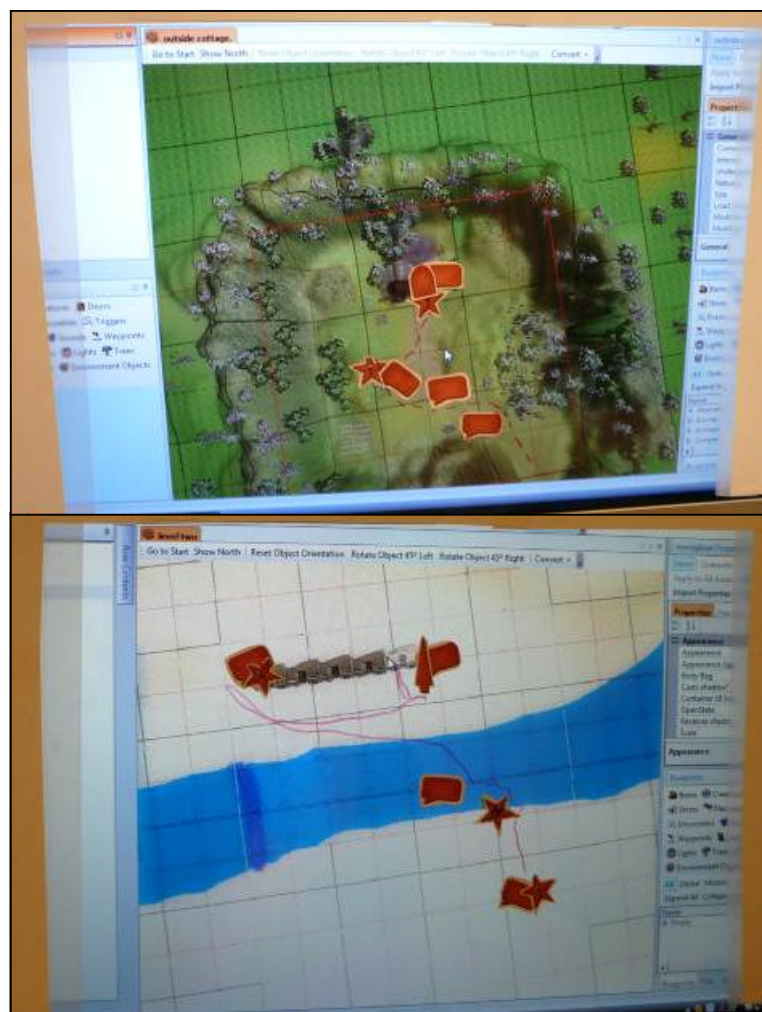


Figure 3.4: Participants using paper prototype to show important story events in their areas

Participants were introduced to the paper prototype, asked to pick an area of their game and place the icons in the appropriate locations. Video recordings were made of the activity and photographs taken at key moments, and the videos were later transcribed. The participants were

able to place the icons onto their areas in the correct positions, as illustrated in Figure 3.4, and found the representation reasonably easy to understand. In some cases they understood exactly what the icons represented and were able to interrupt and finish explanations as the researcher introduced them, but in other cases the icons did not seem to be intuitive, highlighting a need for further work on designing understandable icons.

In the second half of Design Study 3 twelve children (aged 11-12, six boys and six girls) selected from the two classes taking part in the game making project, were asked to help with the design of icons for the augmented map view representation. The map used in this study is shown in Appendix A.5. Pupils individually designed icons which they thought best represented the key character and object type. Pupils then took part in a group discussion about why particular icons were easy to understand, until a consensus was reached about the most appropriate icons for each category. The representational ideas agreed upon were turned into a final set of icons used in the tool, which can be seen in the following chapter. Two sets of icon designs from this study are shown in Figure 3.5.



Figure 3.5: Participants' icon designs

3.4.6 Branching narrative diagram

Theoretical Background. Structure of narrative transmission is one of the key elements of importance in narrative discourse. It describes the way in which the underlying story content is conveyed to the audience, and is closely connected with the idea of plot (Chatman 1978).

As discussed in section 2.4, holding complex mental representations, such as a branching plot line, in working memory can be problematic as it can place a high cognitive load on the user (Mayer and Moreno 2003). Reflective cognition requires the ability to store temporary results and use those results in further thought processes. For this reason external representations can facilitate reflective cognition by allowing more complex chains of reasoning to be built up (Norman 1993).

Approach Adopted. Creating a branching interactive plot with multiple modes of expression is a hard task, and keeping this constantly in working memory is not feasible, so a visual representation of the plot under creation is needed. Previously, an interactive storytelling support tool has made use of plot graphs to show the connections between different ‘scenes’ in an interactive story (Weiss, Müller, Spierling et al. 2005; Spierling, Weiß and Müller 2006), and a similar representation has been used for the design and debugging of virtual reality environments (Winterbottom et al. 2006). Furthermore, research in the area of game design with children has explored young people’s ability to understand branching plot diagrams in the form of a simplified Augmented Transition Network (ATN) (Goolnik, Robertson and Good 2006). Here the researchers found that children aged 10 were able to follow an interactive story represented in the form of such a diagram and able to correctly answer questions about what would happen if different choices were made in the story. They were also able to use a hi-fidelity prototype storytelling tool and create some simple stories which included branching between scenes. We chose an ATN-like diagram style because of the evidence from this previous work that children can use diagrams of this type.

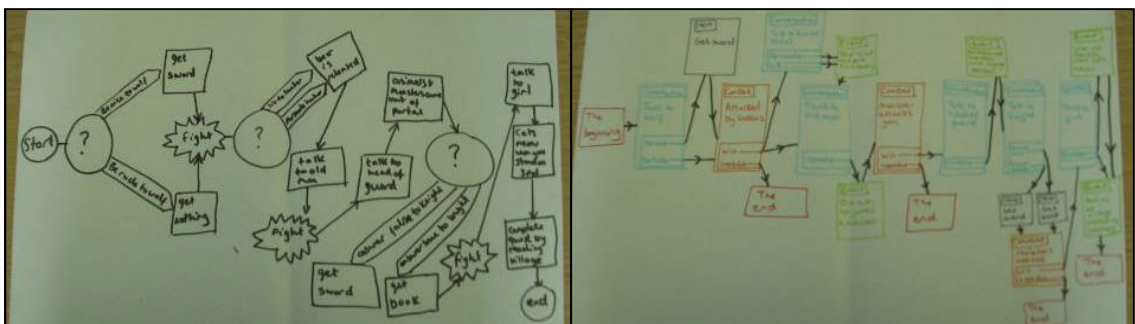


Figure 3.6: Example branching narrative diagrams

Participatory Design. A further design activity was carried out as part of Design Workshop 3. After working on icon designs, the same twelve children (aged 11-12, six boys and six girls)

were also asked to draw branching narrative diagrams to represent the narrative structure of their games. These diagrams were loosely based on an ATN model. Pupils were introduced to this type of diagram by being shown two examples of games mapped out in diagrams of the same general type, but with variations in convention, as shown in Figure 3.6. They were told that these were examples of how game stories could be drawn, but encouraged to use whatever method they found most helpful to show the stories in their own games.

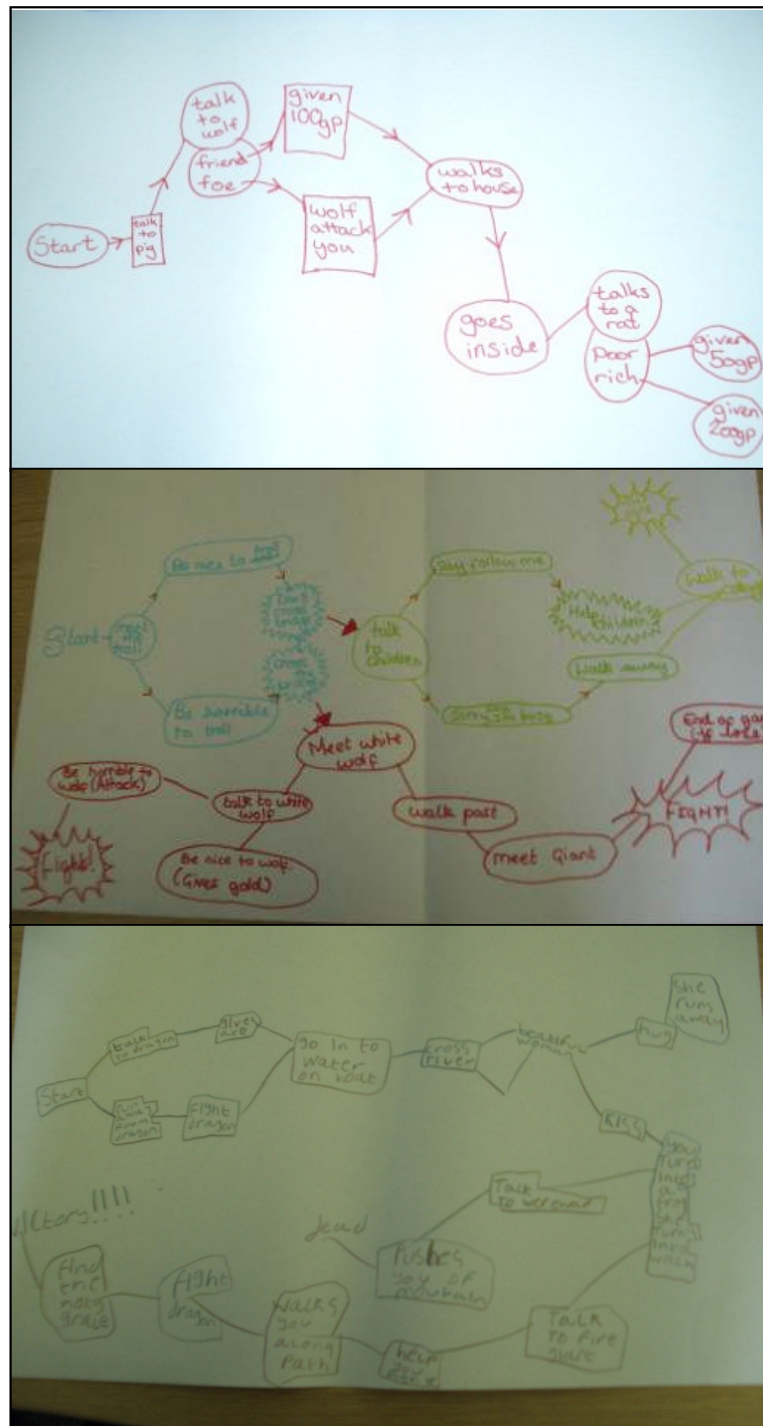


Figure 3.7: Diagrams drawn by participants

Design activities were audio recorded and photographs were taken of the designs. After checking that participants were able to understand the diagrams and felt able to draw their own diagrams, they were instructed to draw a similar diagram in any way they chose. They were told that they did not have to use the same style as any of the example diagrams, so long as it was possible to see what happened in their games if the player made different choices.

The children were able to create diagrams of their own which represented the plots they were in the process of creating; three examples of these are shown in Figure 3.7. Most participants reported that they found the task easy and created diagrams of some complexity, but some struggled with the task and created only basic diagrams. Participants did not adopt a consistent approach to representing different elements, with a slightly different node design used each time an element of a certain type was referred to. Most diagram nodes featured objects or characters around which significant story events revolved, but in some cases ‘travelling nodes’ which described a movement the player would make were included, such as ‘player walks to house’.

In the workshop setting of Design Study 3, participants were asked to draw the diagrams as a one-off activity at around the mid-point of the game creation project. However, the branching narrative diagram is not to serve only as a planning tool, but also as a representation of the plot as it develops. In order to design a tool which could be used throughout the game making process, it was necessary to explore the use of such diagrams over a longer period.

At Design Study 4, a five-day summer holiday workshop, 12 young people aged 11-15 took part in a gamemaking activity. Early in the week participants were introduced to branching narrative diagrams as outlined above and asked to work on their own diagrams on large public displays by each of their work stations. Figure 3.8 shows three diagrams drawn by participants.

In line with the findings from the previous study all participants could understand and follow the ATN style diagrams. Additionally, in this setting all participants managed to create their own diagrams of reasonable complexity. This difference may be due to the increased interest and ability of the young people who had elected to attend a workshop with an educational element during their school holidays. Again, most diagram nodes were based around significant characters or objects, with a few ‘travelling nodes’ included.

Participants were encouraged to go back to their diagrams throughout the week and edit them as they made changes. Most participants did this at least once, but as the week progressed some of them found other representations such as “to do” lists to be more helpful. Some participants kept their diagrams up to date throughout the project but others left theirs at an earlier stage and did not return to them.

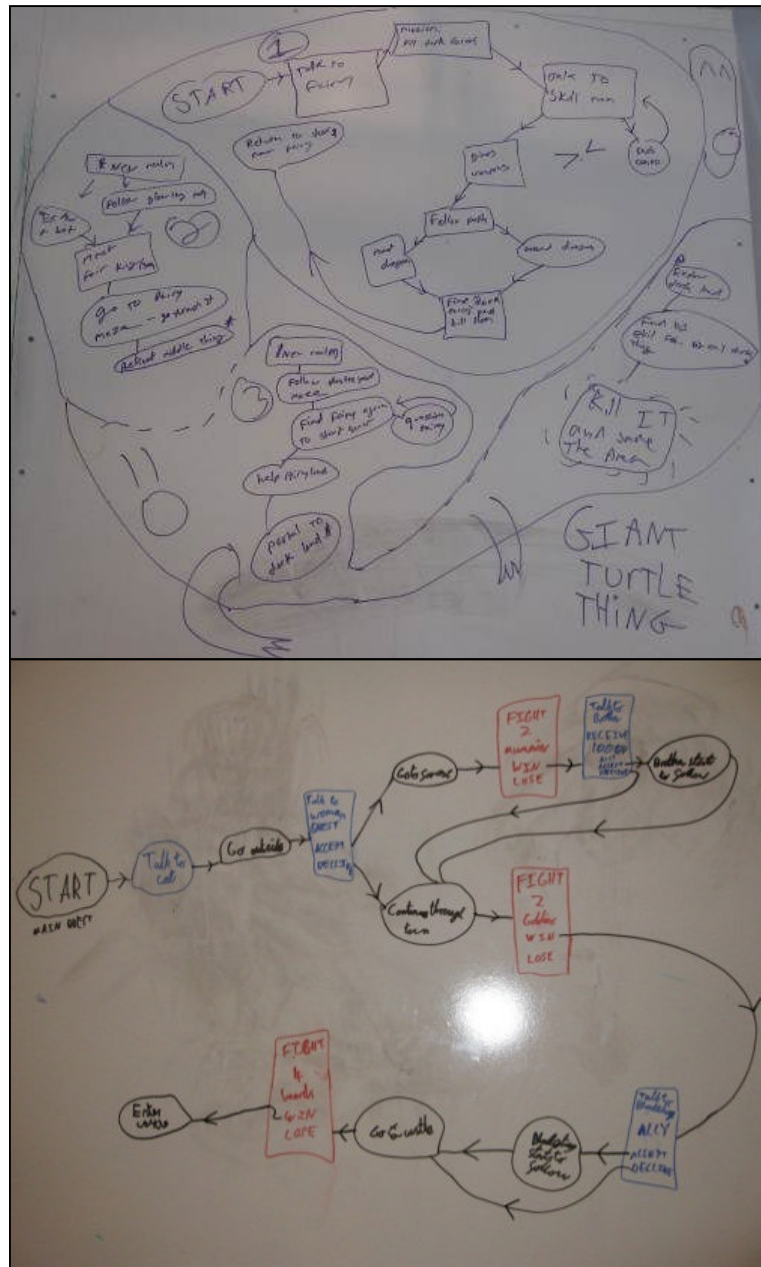


Figure 3.8: Two diagrams drawn by participants on large whiteboards

3.5 Chapter Summary

In this chapter I have described a participatory design process involving teachers and young people, which examined the support required for young people to develop writing skills through narrative-based game creation. The key type of support which this thesis focusses on is representational software, which is designed to focus young people's efforts on the game creation tasks which are most salient in relation to the development of writing skills, and to support them in conveying more complex narratives than might otherwise have been possible.

However, throughout the design studies I have also taken steps to examine the importance of the support provided by the broader setting, such as supporting tasks and the significance of context.

This area of investigation will be returned to in Chapter 5 and Chapter 7. The following chapter describes the implementation and system description of the software support in a suite of tools referred to as Narrative Threads.

4 Narrative Threads: Implementation & System Description

In this chapter the technical implementation of Narrative Threads (NT) is explained, and a full system description is given. First, a high-level overview of the implementation of NT as a plugin for the Neverwinter Nights 2 toolset is given to illustrate the technical challenges which were addressed and solved. Following this, the completed system is described, with reference to how key features relate back to the design process findings.

4.1 Background

The Neverwinter Nights 2 Toolset includes a plugin interface which allows end-users to create new functionality for the toolset and customise existing behaviour. Plugins can be authored using the C# programming language (and other .NET languages). The developers of the toolset provide a set of public classes, exposing aspects of the toolset's inner workings so that new functionality (in the form of plugins) can be tightly integrated. However these are provided without any documentation or support, leaving plugin developers to explore the functionality on their own. The codebase is large and unwieldy and contains many bugs and quirks.

An assembly browser is required to allow this exploration of the contents and functionality of the available assemblies. In this implementation I used Red Gate Software's .NET Reflector (<http://www.reflector.net>), a popular assembly browser, to support my developing understanding of how the libraries worked.

Once plugins are compiled the resulting assemblies (DLLs) can be added to the toolset plugin folder and will be loaded every time the toolset starts.

4.2 Implementation of Narrative Threads

I wrote Narrative Threads in C#. Overall, this solution consisted of around 6,000 lines of code (excluding white space, comments, braces and declarations of members, types and namespaces) and was a considerable enterprise in its own right. The set of tools includes both Windows Forms and Windows Presentation Foundation (WPF) GUI elements. The newer WPF technology supports more advanced graphical effects and was required for the implementation of the diagramming tool (see 4.2.4), but the other tools were implemented using Windows Forms to allow close integration with the existing toolset components which were built using this older framework.

The individual components and their high-level functionality are described below, and more detailed descriptions of behaviour are given in the system description in Section 4.3.

4.2.1 Character Creator

The character creator allows users to create new and edit existing characters which can be added to NWN2 game modules. The GUI for this tool is a Windows Forms wizard with five tabs corresponding to different categories of character settings. Allowing users to change character settings required the import of game data from two dimensional arrays stored within the game installation files. These are imported when the character creator loads and stored in sorted dictionaries for use in drop down menus within the wizard. A 3D graphics panel appears on the right side of the wizard on all pages and shows the current configuration of the character which is being created. The panel is a bespoke user control created by the toolset developers to allow viewing of creatures and objects within the toolset and made available as a public class for use by plugin developers. Considerable configuration is required before the panel can show an object, including setting the light source, the camera position, direction and zoom and other scene properties. The 3D panel is updated every time the user changes a character setting which has a physical representation, and an appropriate animation is played when character faction setting are changed (for example, when the character is set to be an enemy, an attack animation is shown in the panel.)

When a new character is created an initial default character is shown in the 3D window, and the drop down menus and settings show the properties of the default character. In contrast, when an existing character is being edited, the elements reflect this character's current settings. The settings which can be edited are described in Section 4.3.1. When the user saves and exits, a 2D image of the character appearance as shown in the 3D window is captured, and this is saved along with the other character details as a 'story element' record. A new character 'blueprint' is also created within the game data for the current module to allow the addition of the character to the game world at a later stage.

4.2.2 Placeable Object, Item and Door Creators

The placeable object, item and door creators allow the user to create new and edit existing objects, items and doors within the game. The GUIs for these tools are Windows Forms wizards, and they take the form of simplified versions of the character creator, each being single screen dialogs. Again, the relevant data is imported from game files at start-up for each of these additional wizards. With the placeable object and door creators, a 3D panel is displayed on the right-hand side of the form and shows the appearance of the currently selected option in the same way as described above for the character creator.

The item creator has a different setup for displaying appearances, which reflects the more complex rules for item appearance within the game. Every item in the game has an associated 2D icon which appears on the player's inventory display when the object is picked up in-game. All items appear as a 3D model of a bag when placed in the game world. Additionally, equipable item such as weapons and armour items have a different 3D appearance which is shown as part of the player's appearance when the item is worn or equipped. Thus, the item creator must look up the item type from the game data in order to determine the most appropriate display options. It shows a 2D icon for all items under creation, and the 3D panel shows either a model of a default character with the item equipped or the bag model for non-equipable items. On saving, the relevant records are created as described for the character creator, and the appearance as shown in the 3D panel is captured and saved as the associated story element image.

4.2.3 Story Elements Panel

The primary function of the story elements panel is to display the characters, placeable objects, items and doors which have been created by the designer using the creator wizards. It also serves as the location of the buttons for creating new elements of these types and for loading the branching narrative diagram, and the toggle to turn the augmented map view on and off. It is a Windows Forms Panel integrated within the toolset interface.

Adding a new element to the toolset GUI was beyond what the developers intended plugin authors to be able to do, so I used reflection to overcome this restriction. Reflection allows the inspection of metadata about classes at runtime, which among other things makes it possible to access private members of a class, this enabled me to add new interface elements to private panels of the toolset GUI. (Although using reflection to access private members is not regarded as best practice, it was necessary in this case to achieve a smooth integration of plugin and toolset).

Each story element is displayed as a card, with different tabs for the different element types, and a background colour matching the type. The card provides the toolset with relevant data about the story element, so that when a card is selected and the mouse is moved into the 3D area window, a 'ghost' model of the element in question appears in the area and follows the mouse until the user clicks to add the element to a certain location within the game.

4.2.4 Branching Narrative Diagram

The branching narrative diagramming tool was written in eXtensible Application Markup Language (XAML), a declarative language used to build graphical user interfaces in Windows Presentation Foundation, which forms part of .NET 3.0 onwards and is the successor to

Windows Forms. WPF allows for more interactive and visually appealing GUIs than its predecessor.

A simple diagramming tool was created from scratch to meet the specific requirements of this tool and to allow it to be fully integrated within the toolset architecture. In order to display the diagram as a tab within the toolset, it was again necessary to use reflection to work with protected classes at runtime.

The scenes that are used to compose the diagrams are generated from the story element records. Each scene has one or more branch points, with the number calculated at the point of generation by looking up the properties of the relevant game objects and associated resources. For example, if the scene involves the player talking to a character the number of branch points shown on the scene will correspond to the number of different conversation options which have an associated action, and each will be labelled with its associated line of conversation. The objects representing the scenes, and the connecting lines make use of 'thumb' elements to allow dragging and dropping onto the diagram, and the drawing of new connectors. The functionality is explained in detail in Section 4.3.4.

4.2.5 Story Icons Augmented Map View

The augmented map view uses custom textures and 3D models imported to the toolset to mark the location of all story elements which have been added to the game world. As there is a very limited capacity for interacting with the 3D game view from the toolset classes (even using reflection), the augmented map view is made up entirely of in-game elements generated on the fly. This method required careful configuration to ensure that these elements worked effectively without interfering with the game-world.

The interface element is made up entirely of in-game elements, and manipulation of camera view using the classes made available for plug-in developers. When the story icons view is turned on, an object is created with one of seven appearances depending on the element type and the status of certain properties of the element in some cases. This is achieved by examining each object within the currently displayed area, assessing whether it is a story element by examining its unique tag against the record of story elements, and creating an icon with the correct appearance at a set height above the in-game object. The view of the area is also set to a top down centred view when the story icons are turned on; this is achieved by manipulating the camera controls within the toolset.

4.3 System Description

In this section the functionality of each of the tools is explained in detail, along with discussion about key design decisions and their origin in the theory and participatory design work discussed in Chapter 3.

4.3.1 Character Creator

The process for creating a main character or plot relevant item now takes place using a wizard (less important characters/objects, or ‘extras/scenery’ can still be added in the usual way). Design activities (see Chapter 3) indicated that target users were keen on configuring characters in fine detail, but this was largely limited to appearance-related properties. Evidence from the interviews suggested that these elements were motivating because users could see a clear outcome from their effort: the visual feedback was strong and the impact on their game was obvious.

Typing descriptions about a character’s personality and back-story were not seen as appealing because there was no clear pay-off for such an activity. To counteract this problem and ensure that activities which are important to storytelling are seen as important by users, the Narrative Threads wizards give clear feedback for these activities and ensure that there are obvious outcomes for the game under creation. A persistent visual portrayal of the character was added in the form of a 3D window on the right-hand side of each screen so that users could see the effects of their changes and get immediate feedback as to the implications of those changes.

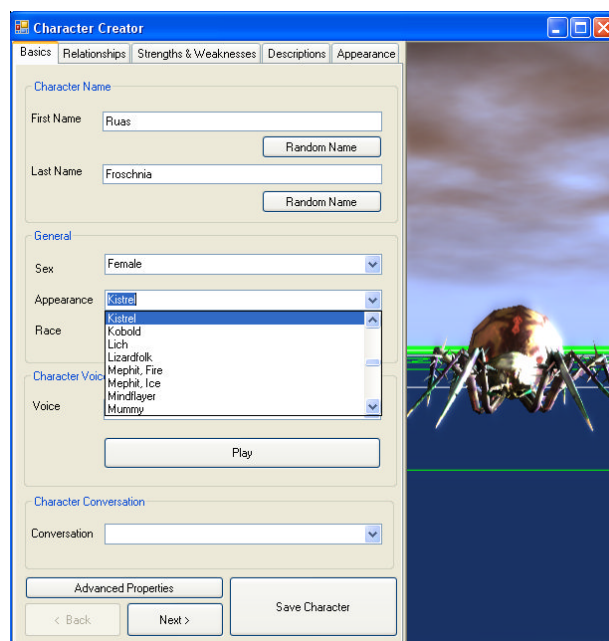


Figure 4.1: Setting appearance on Basics Screen

The character wizard is navigated using labelled buttons in addition to 'next' and 'back' buttons to make it easier for users to find the option they want to change, in line with comments from design participants about the difficulty of finding certain settings in wizards.

The Basics screen is used to configure essential details for all characters, including details such as name, gender and basic appearance, as shown in Figure 4.1. The 3D window shows feedback from changes in appearance settings and an audio file can be played to support users' choice of the character voice.

The next screen is Relationships, which allows the user to choose whether the character they are creating will be the player, an enemy of the player or friendly/neutral towards the player. Because of feedback from users in the earlier design sessions about confusion due to the complexity of genre specific language, this screen translates the in-game terminology of 'commoner', 'hostile' and 'defender' into short sentences which describe the way such characters will behave towards the player.

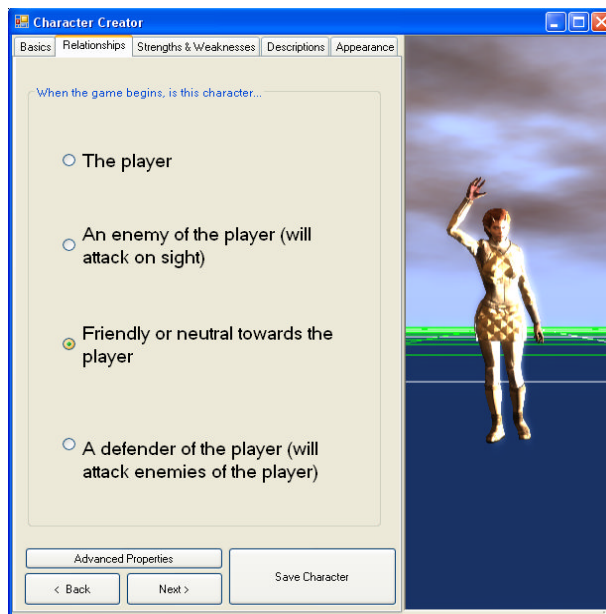


Figure 4.2: Visual feedback from changing relationship setting to friendly

The 3D window gives visual feedback on the choices made by animating the character model in a way which reflects the chosen relationship type. Figure 4.2 shows an example of the animation which results from choosing the friendly/ neutral relationship option.

The third screen, Strengths and Weaknesses (Figure 4.3), allows the user to set character traits by dragging and dropping descriptive phrases. This screen is key to the aim of encouraging reflective thought about a character's significance in the story.

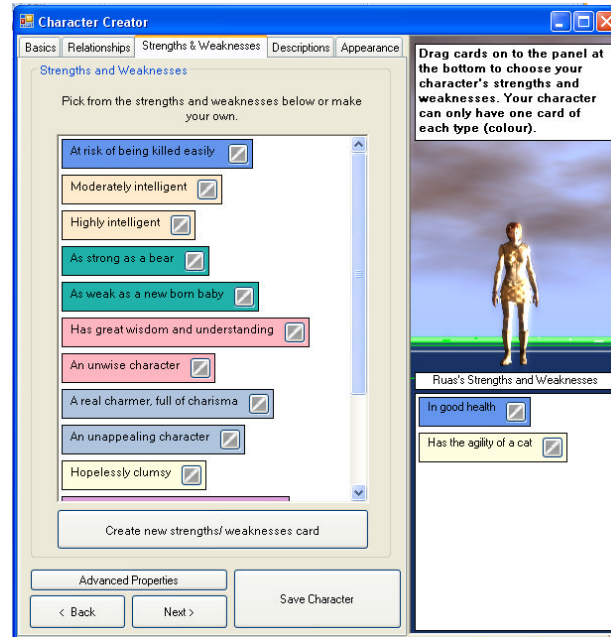


Figure 4.3: Strengths and Weaknesses screen

The game engine has a range of in-built parameters which affect the behaviours and abilities of characters. The parameters most important to the game are the characters' ability scores across five measures: Charisma, Constitution, Dexterity, Intelligence and Strength. On the Strengths and Weaknesses page users configure these elements, as well as the health points the character will have, using descriptive phrases which explain these terms in everyday language. For example, a low charisma score is marked by the description 'An unappealing character'.

This design unites input from teachers about the potential for improving descriptive language through the activity and input from target users about confusion caused by the in-game terminology. Users are also able to define their own descriptive terms by loading a small pop-up window which allows them to type in a new description and pick the associated trait and score. It was not possible to show feedback for character strengths and weakness, as appropriate animations were not available.

The next screen, Descriptions, invites users to enter two different character descriptions, as shown in Figure 4.4. The participatory design sessions gave insight that boxes such as these would be skipped or completed quickly with little thought if there was no clear in-game benefit to completing them. However, input from domain experts indicated that the process of writing descriptive passages would help users to think more deeply about the character under creation, as well as giving them more general practice in writing. This design tension was resolved as follows. Descriptions were included, but the tool aims to show clear benefits for typing one of the descriptions. The first description entered is tied to the in-game description of the character and can be made to show on the in-game map, and crucially, this is made clear to the users at the point of writing through the inclusion of an image showing where such a description will appear. The second description is deliberately left without a clear relevance to the in-game world to allow investigation of the extent to which this will affect what users type into the different boxes.

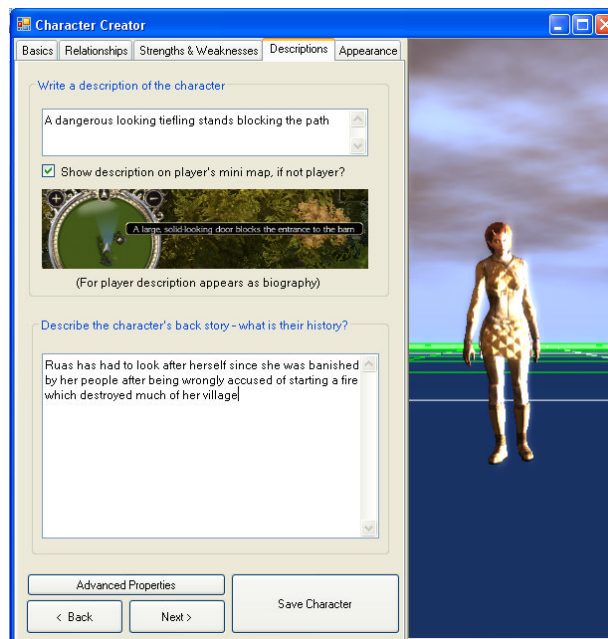


Figure 4.4: Descriptions screen

The final screen (shown in Figure 4.5) allows the user to customise details of the characters' appearance using the existing functionality for changing things such as eye colour and skin tone. This page deliberately comes last in an attempt to ensure that the young users do not expend all of their time and energy on this part of the activity. However, users can navigate to screens in a different order to the one suggested by simply clicking on the button for the corresponding page.

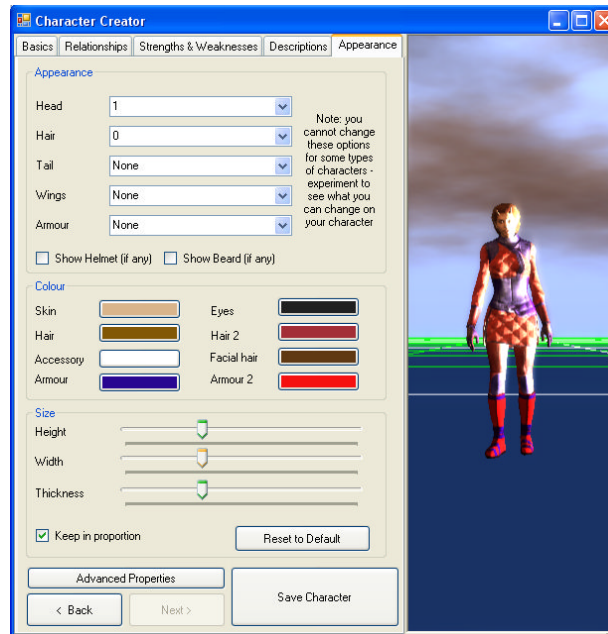


Figure 4.5: Appearance Screen

The character creation process has been transformed from one which can be achieved thoughtlessly to one which requires reflection carefully directed at certain activities. Crucially however, the users are not asked to carry out activities which do not have a noticeable effect on the finished game.

4.3.2 Placeable Object, Item and Door Creators

The same principles are applied to the design of wizards for creation of other in-game objects which have relevance to the plot. These make use of the same ideas, but in a greatly simplified form, as illustrated in Figure 4.6 which shows the item creation wizard. The other creator tools are all single screen dialogues which allow the user to select the basic type of object they would like to create, and preview the range of different appearances available before choosing one. For example, in Figure 4.6 the basic type of ‘Hammer’ has been selected, and a specific ‘Adamantine’ style hammer has been chosen. The preview window shows the 3D appearance of the object under creation, in the case of equipable items this is shown as equipped on a default character, and includes the associated inventory icon above. In the bottom half of the screen the user can give the item a name of their choosing, and enter an item description. As with the character description the user can choose to have this description text appear on the player’s map in game along with a map point showing the location of the object.

The user can, if they have a specific need for altering other aspects of an object, launch the advanced properties window for the object, which is an inbuilt game dialogue listing all properties which can be altered. Finally, once the user is happy with their object design they click to save it, and the resulting object becomes available in the story elements panel, described in the following sub-section.

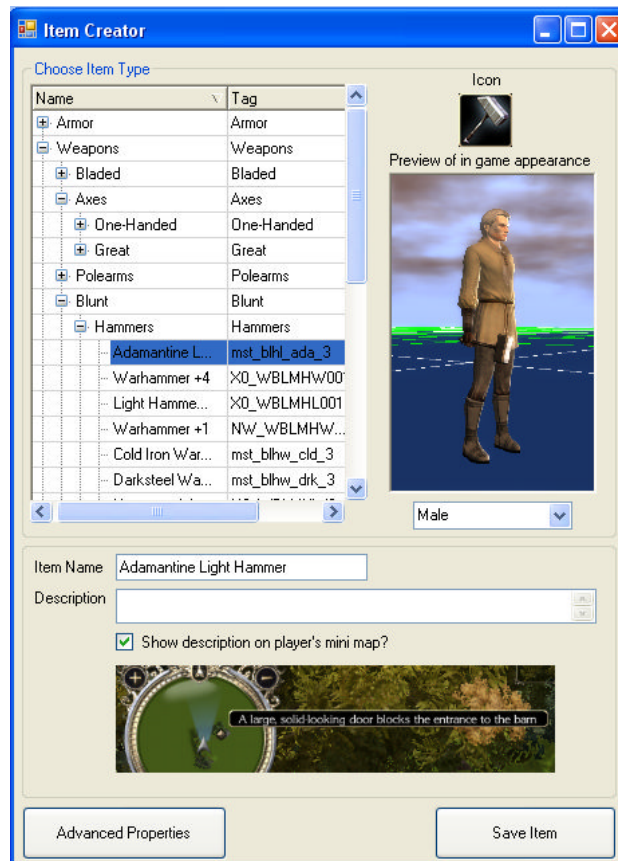


Figure 4.6: Item creation wizard

4.3.3 Story Elements Panel

The story elements panel, shown in Figure 4.7, shows the story elements created, allows these elements to be added to areas, and includes buttons for creating new elements.

The top of the panel displays buttons for launching each type of creator tool, labelled 'New Character', 'New Object', 'New Door' and 'New Item'. The buttons launch the creator tool wizards described above.

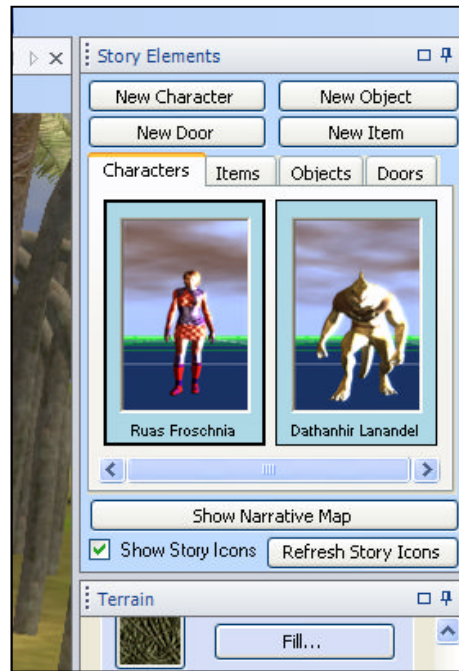


Figure 4.7: Story Elements Panel

The central part of the panel displays the characters and objects created using the wizards in the form of colour coded cards representing the object type. Four different tabs show the different types, and each card contains a 2D image of the object, captured at the point of saving in the creator tool. To add a story element to a game area, the user clicks to select the object and the card is outlined in a bold line to show that it has been selected. Once selected, when the user moves the mouse into the 3D area view a ‘ghost’ model of the object appears and follows the mouse cursor as it moves around an area. To add the object to the game the user clicks when it is in the desired position. To edit an existing story element the user must right-click on the corresponding card, and click ‘Edit’ from the context menu which appears.

At the bottom of the story elements panel there are buttons for launching the ‘Narrative Map’ (the interface title for the branching narrative diagram), a check box for toggling the story icons, and a button to refresh the story icons.

4.3.4 Branching Narrative Diagram

The branching narrative diagram serves not only as a planning tool, but also as a representation of the plot as it develops. The aim was to provide visual feedback to the user to contribute to their developing idea of how their story is progressing in between game testing sessions. A fully automated ATN diagram creation process was ruled out due to the computational complexity of such a task and the potential for reflection on the plot to be supported through the act of learners composing the diagram themselves. However, findings from the participatory design process suggested that it would be beneficial for some aspects of the diagramming task to be automated. The lack of consistency in node representations in diagrams created by target users suggested

that automatically creating nodes to a standardised design would be beneficial to facilitate the comprehension of assembled diagrams. Additionally, findings from diagram use over a prolonged period showed that some target users were likely to forget or otherwise choose not to make updates to their diagrams as they made alterations in game, suggesting that it would be beneficial for nodes to update as changes were made, where possible. As a result of these design decisions, the branching narrative diagram provides users with the building blocks to create the diagrams, but users compose the diagrams themselves. There is also a facility for custom blocks to be created to account for events such as journeys (the ‘travelling nodes’ seen in participatory design sessions) which cannot be automatically generated, and to allow users to plan for future developments where characters or objects have not yet been implemented.

The diagram tool is launched from the story elements panel. On loading, the user is initially presented with a blank diagram space with only start and end nodes in place. At the bottom of the screen is a panel which contains all the plot events so far created by the user, presented as scenes. These include events generated from important objects, and scripted events. Table 4.1 shows the rules by which the scenes are automatically generated from important story elements.

Table 4.1: Rules for scene generation based on important objects

Object	Conditions				Scene(s) created
Character	Hostile				Fight Scene
	Friendly	No conversation			Meet Scene
		Conversation	With script	Non-attack script	Branching Talk Scene
				Attack script	Branching Talk Scene + Fight Scene
				Without script	
Item	None				Get Item Scene
Placeable Object	None				Use Placeable Scene
Door	None				User Door Scene
Flip script	None				Script Scene (with description of script functionality)

This diagrammatic representation has much more power to show interactivity than the augmented map view, although it is not possible to get a sense of in-game spatial relationships in this view.

The majority of the interactivity in the diagram is represented through diverging paths between scenes, but talk scenes and custom scenes can have branch points within them. The item and object scenes have a single outcome; the picking up of an item or the using of an object. The alternative (not picking up and not using) are represented by the scene not being included in a given path through the diagram. There are more subtle encounters with items or placeable objects, such as seeing them but not interacting with them, but in the interests of keeping the diagrams to a manageable level of complexity, these scenes were not included by default. However, custom scenes allow events of this sort to be added to the diagram.

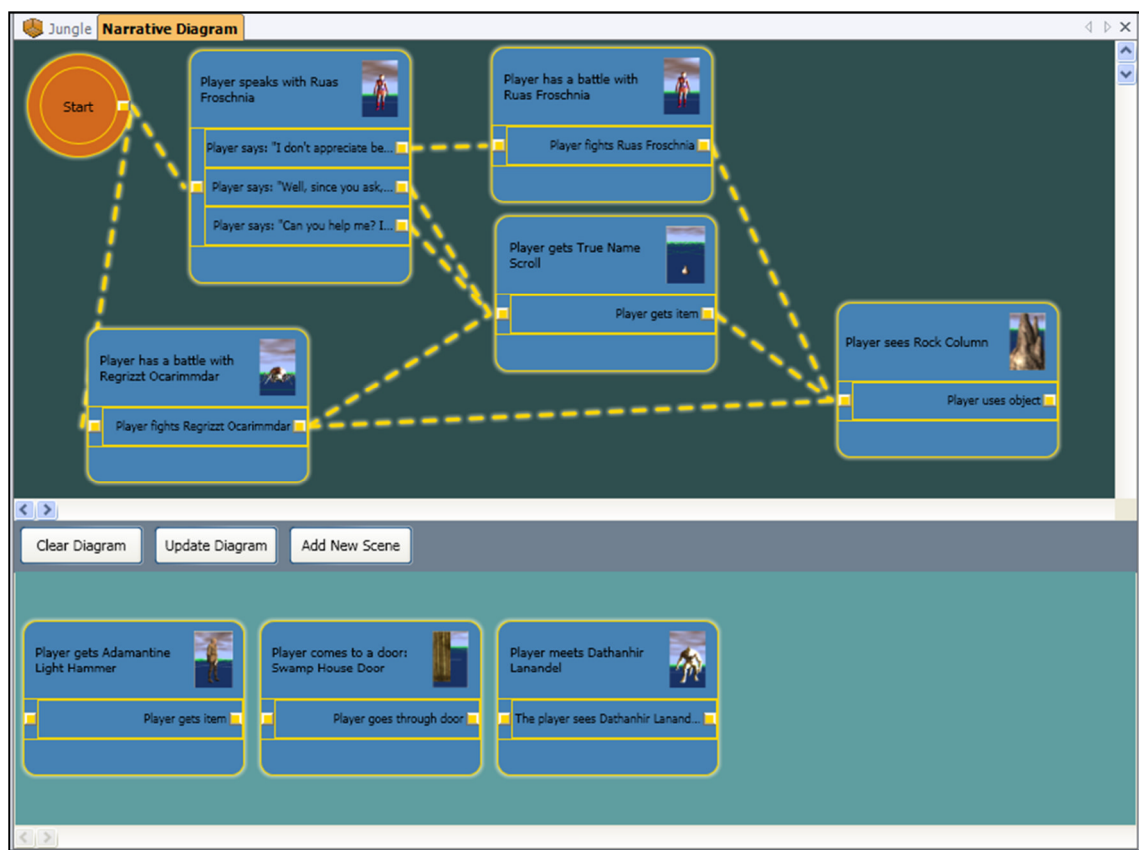


Figure 4.8: Branching narrative diagram being edited

Diagrams are built up by users dragging scenes from the bottom panel on to the diagram, and once scenes are there, users can draw connections by clicking on the connection point and dragging to draw a line to another connection point. Start and end nodes are distinct, and connections can only go in one direction; from an end node of one scene to a start node of another scene. Once a user has started creating a diagram for their game, their progress is saved and when they return to the diagram tool later, they see the diagram they were previously working on. When a diagram is loaded, the tool checks for changes to elements involved in the

diagram, and the corresponding scenes are updated with the alterations. In the case of an object being deleted, the related scene is removed from the diagram. This update process can also be carried out manually by the user clicking update within the tool (as the diagram can be left open whilst changes are made in other windows). Figure 4.8 shows a diagram under creation.

Custom scenes are created by the user clicking ‘Add New Scene’. This brings up an editor which allows the user to add a scene title as well as a list of potential branch points, as shown in Figure 4.9.

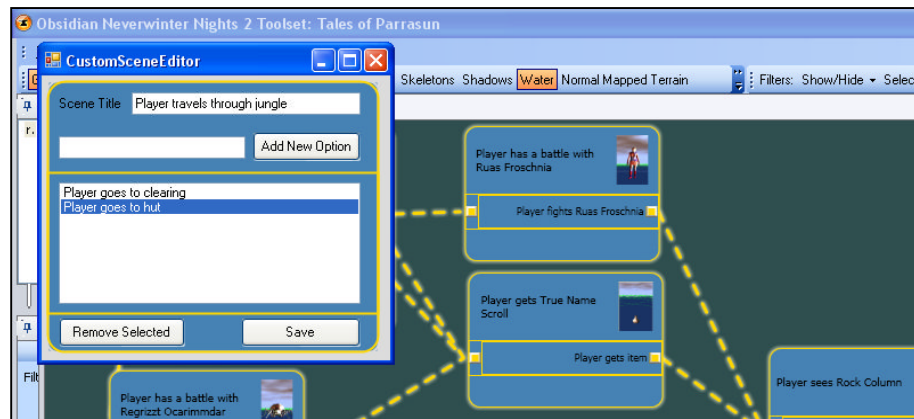


Figure 4.9: Creating a custom scene for use in the Branching Narrative Diagram








4.3.5 Story Icons Augmented Map View

The augmented map view is a modified version of the existing toolset area view. It shows where key story objects are located, and indicates through different icons which type of story event can happen at that location. Users can switch off the icons, but they are turned on by default. Participatory design sessions indicated that target users could understand a representation of this sort, and were even able to create their own correct representations when icons were provided, showing a reasonably deep level of comprehension. The final icon designs are drawn from design work by target users at a participatory design session, with each icon type based on the representation which the majority of target users felt was most clear. Table 4.2 shows the icons and how they are automatically generated from the story elements in the game areas.

It is important to note that this spatially related mode of representation is not well suited to showing all the potential states or behaviours of a character or object, given that a single icon needs to be picked to show all possible events for a character or object. It would be possible to ascertain (by analysing scripts and conversations) whether a character who is friendly when the game starts has potential to turn hostile based on the player’s choices during the game. However, the story icon shown will only represent the character’s hostility or friendliness at the start of the game. One approach would be to attempt to represent all possible interactions within a single icon, but given the size of the icons this was not practical. The branching narrative

diagram, as presented in the following sub-section, is greatly superior in its representative power for interactivity.

Table 4.2: Rules for icon generation based on important objects

Object	Conditions		Icon created
Character	Hostile		Battle 
	Friendly	No conversation	Character 
		Conversation	Speech Bubble 
Item	None		Important Item 
Placeable Object	None		Important Placeable 
Door	Without transition		Door 
	With transition		Transition Door 

Icons are turned on and off by a checkbox in the Story Elements panel, and they update instantly when the corresponding object is moved. When the user clicks to turn on the icons, the area view is shifted to a zoomed-out, top-down camera angle, as shown in Figure 4.10. This story icons view gives the user an overview of their area augmented with an indication of the location of key story events.



Figure 4.10: (top) 3D map view without icons, (bottom) augmented 3D map view

4.4 Chapter Summary

In this chapter I have described the Narrative Threads tools in some detail, with reference to the underlying design decisions. The general approach to the tools is to encourage reflection on tasks which are strongly related to narrative creation and meaning-making tasks analogous to those carried out in traditional writing activities.

The character creator tool scaffolds the process of character creation in order to focus attention on the aspects of the task which are most important in a narrative context, for example, the relationship between the character and the player, the character's traits and descriptive text about the character. Care has been taken to give feedback about how work put into characterisation will pay off within the game world. A 3D representation of the character gives feedback within the creator tool, character traits are clearly tied to in-game behaviours and properties, and a visual representation shows how character descriptions will appear within the game. Creation of other key story elements, placeable objects, inventory items and doors, is supported through separate creator tools. These other tools are greatly simplified in comparison with the character tool, as far fewer of these other objects are likely to have significance to the narrative. These tool are condensed to a single screen which guides the designer through creating the appearance, naming the objects and writing a description of the object. Again, a screen shot is used to show where the description will appear within the game.

The story elements screen provides a persistent representation of all story elements which have been designed using the creator tools. In this way the effort put in to the creation process is reflected in the growing collection of characters and objects. This panel also allows the characters and objects to be added to a game area, the creation of new story elements, and the launching of the two further elements of Narrative Threads.

The branching narrative diagram (or 'Narrative Map' as labelled in the toolset) allows the designer to build a high level representation of the branching enacted narrative which the player can take part in through the game. Its aim is to support the building of potentially complex branching narrative by encouraging the designer to reflect on the consequences of player choices within their game.

Finally, the augmented map view involves the addition of story icons to the toolset's existing 3D area view. These icons, when the view is toggled on, show the location of all key story elements within a game area. The icon design indicates whether the element is a character, placeable object, inventory item or door, and dynamic elements indicate further key properties of the element, including the way a character will behave towards a player, or whether a door provides a transition to another game area.

Two naturalistic field studies, which allowed evaluation of Narrative Threads in real-world learning contexts, are presented in the following chapter. These studies also allow investigation of the broader benefits of narrative-based game creation and the importance of the surrounding context, in line with the thesis research questions.

5 Evaluative Field Studies

5.1 Introduction

In order to address the key thesis research questions, two naturalistic field studies were carried out in contrasting real-world settings. One study took place in a secondary school and one was conducted at a vacation workshop. The studies were designed to evaluate the potential for game creation to support the development of writing skills, as well as evaluating the benefits of Narrative Threads, the suite of tools designed to provide additional support. An additional goal was to observe users in two contrasting educational settings, and examine how the setting affected the activity, usage of the tools and any consequential learning gains.

This chapter describes the school study first, followed by the workshop study. For each context the study design and settings are outlined, including the research methodology used, and the participants and procedure in each study. Following this, the study findings are presented, with reference to data gathered before, during and after the game creation project relating to participants' writing abilities and their usage of the game creation software. The games created in both settings are examined in detail in the chapter which follows this one.

Table 5.1 shows the thesis research questions and the chapters in which they are addressed. RQ3 has been addressed through the design work in Chapter 3. The design work also allowed for data relevant to RG7 to be collected, as observations on the context of four different game creation projects were recorded.

The data presented in this chapter is examined with a view to answering RQ2, RQ4, RQ5, RQ6 and RQ7. Chapter 6 focusses on the games created during these studies, and presents in depth analyses of these games to address RQ1, RQ5 and RQ7.

To answer the identified research questions a range of different data was collected. A mixed-methods approach was adopted in both studies, as a number of the research questions were most appropriately addressed using quantitative means, a number with qualitative means, and some benefitted from triangulation from both types of data.

Table 5.1: Research questions and chapters addressing them

RQ#	Question	Chapter(s)
RQ1	Are writing skills demonstrated in the narrative-based games created by young people? If so, which skills are demonstrated, and how is writing used in conjunction with other representational modes?	Ch.6
RQ2	Does narrative-based game creation lead to any measurable improvement in general writing ability?	Ch.5
RQ3	What features are desirable in a tool designed to support the use of writing skills in game creation, and improvement of writing skills more broadly?	Ch.3
RQ4	How is this additional interface support used by young designers over the course of a game creation project? Does the additional support change the way the toolset is used, and is there any motivational cost from the tool?	Ch.5
RQ5	Are there noticeable differences between the games created with the additional interface support and those created without this support? If so, how do these games differ, and is there a difference in the writing skills demonstrated in the games?	Ch.5, Ch.6
RQ6	Does the additional representational support in Narrative Threads lead to any greater improvement in writing ability?	Ch.5
RQ7	How can the broader activity context support game creation? How does it affect the usage of the additional support, the skills demonstrated in the games created, and any improvement in writing ability?	Ch.3, Ch.5, Ch.6

Formal ethical approval was obtained for all evaluation activities described here. In the school study, as the game creation project was integrated into normal classroom activities, key aspects of the task were deemed compulsory for all pupils by their class teacher. Written parental consent was obtained for all activities which were in addition to standard classroom activities, including collection and usage of voice, photo and video data where appropriate. Where parental consent was given, pupils were then given a choice about whether or not to volunteer for evaluation activities. In the workshop setting parental consent was sought and obtained for taking part in the workshop, and all data gathering activities. The consent forms which were completed by parents of all children taking part in evaluation activities can be found in Appendix B.1.

In each setting, data was gathered about the young people's writing ability before and after the game creation project. In the school context, general writing ability was measured, whilst ability on multimodal writing tasks closely related to the game creation project was measured in the workshop setting. Observation notes were made by the researchers involved in each setting throughout the study period. All game modules created by the young people were also gathered at the end of the project in both settings. Log files of participants' usage of Narrative Threads were collected and examined along with key usage statistics from the module data. Finally, participants were asked to answer a series of questions at the end of the project. In the school setting, these took the form of a survey administered to all participants, and interviews with selected participants. In the workshop setting all participants were interviewed.

5.2 Secondary School Study

The secondary school study, conducted June-July 2010, allowed the gathering of data relevant to answering questions RQ2, RQ4, RQ5, RQ6 and RQ7 in a secondary school classroom setting.

5.2.1 Method

5.2.1.1 Participants

Fifty-six young people aged 11-12 took part in a game making project as part of their year 7 school IT lessons. The pupils were in two classes, both of which were taught the same material by the same IT teacher. One class (27 pupils, 12 male and 15 female) used the NWN2 toolset with the Narrative Threads tools (referred to as 'Toolset NT' from this point forward). The other class (29 pupils, 14 male, 15 female) used the toolset without these tools (referred to as 'Toolset Basic' in the chapter). Both classes were also in the same groups for English lessons, and had the same English teacher.

The school was located on the outskirts of a city in the South East of England. The school was rated as "good" in its last Ofsted inspection (prior to the study), and the examination results were around the national average. The Ofsted inspection report noted that students joining the school have standards broadly in line with national averages, but there was a wide spread of ability and fewer higher attaining students. It was also noted that the school had a higher proportion of pupils who were eligible for free school meals and a higher proportion of students with special educational needs and/or disabilities than the national averages.

5.2.1.2 Procedure

The project ran for one half-term (7 weeks), with 11 fifty-minute lessons scheduled for each class (although both classes missed two lessons due to last minute timetable changes for end of term activities). As a result pupils across both classes spent approximately 7.5 hours on the game creation project.

The project was organised in conjunction with the Flip project. I attended all sessions during the term, and one or two of the other researchers from the Flip project were present for a number of the sessions. In the class using the basic toolset, there was also a support worker to give assistance to two pupils who had low levels of literacy. The pupils' ICT teacher supported the project and was present for all sessions, although she handed over to the researchers for the tool demonstrations.

The pupils' English teacher agreed to support the game creation project and to carry out a project in the pupils' English lessons over the same period which would complement the project to be carried out in the ICT lessons. Following a preliminary meeting, a myth project was decided on for the pupils to work on in their English lessons, which would involve pupils studying *The Odyssey*, and afterwards, writing their own myths. This decision was made because the English teacher had experience of teaching a project similar to this before, and myths fit well with the spatial storytelling for which games are well-suited.

The pupils were given video demonstrations led by the author, introducing them to the key tools and functionality of the game creation toolset. Both classes were given four demonstrations relating the basic toolset features. Two of these demonstrations were the same for both classes (using the terrain editor/blueprints and playtesting) and two had alternate versions, as instructions were slightly different when using NT (conversation writing and interior areas/ area transitions). The class using the NT tools also received two additional demonstrations on using NT: one showing how to use the character/item creators and the story icons functionality and one showing how to use the branching narrative diagram tool to plan their stories. The other class received a demonstration on using the properties window to customise characters and objects in place of the former, and were also encouraged to carry out some character planning activities in notepads after having been given guidance in how to do this. In place of the branching narrative diagram tool, the other class were asked to map out the branching narrative diagram of their game stories on paper.

All videos were made available on a website, with a different page for each class. This was so that pupils could watch videos back in their own time if they missed a demo due to absence or forgot some part of a demo.

5.2.1.3 Data Collection

After each classroom session, observation notes were written up by the author or in some cases one of the other researchers. These notes were then circulated via email to all three researchers working on the study who checked through the notes and added any missing details and differing perspectives.

End of project interviews were carried out with a subset of twelve pupils (six from each class). The interviews covered questions about the pupils' games, including the characters and key elements of story and setting, as well as their experiences with the toolset and additional Narrative Threads tools, where used. Printed screenshots were used to ensure that pupils knew which tool was being discussed in relation to particular questions. The semi-structured interview guide is shown in Appendix B.2. Audio recordings were made of all interviews, and these were transcribed verbatim. Additionally, all pupils were also asked to complete an online survey at the end of the project, and the responses from this were collected after the term had ended. The survey covered attitude and motivation with relation to the game creation activity, as well as more in-depth questions about ease of use and importance of the software tools. All pupils were asked the same questions, with the exception of two additional questions asked of the NT group which were specifically related to NT tools.

In order to examine any differences in writing ability over the course of the activity, data was collected on reading and writing levels before and after the project. This was obtained from the end of term reports routinely produced by the school for each subject. The English reports are produced by the pupils' English teacher at the end of every term, and include overall levels in reading and writing according to the National Curriculum (NC) Framework for Assessment (see Appendix B.3). Reading and writing NC levels for two classes of a similar size in the same year group were also collected from the school for the same time period, to allow comparison of improvement in these skills between the two game making classes and classes who did not take part in a game making activity.

Finally, the game modules created by the young people in the game making classes were collected at the end of the project, along with log files of the interactions with Narrative Threads, for the group which used this tool. The log files and key module data are examined in this chapter, whilst the next chapter presents more in depth analysis of the modules as assessed by trained teachers and myself.

5.2.2 Findings

5.2.2.1 Activity Context

A summary of important observations about elements of setting is given here, along with a description of how the planned study design played out in the real world setting of a secondary school classroom. These interpretations are drawn from the observation notes compiled after each session with input from the other researchers present in the classroom. These observations contribute to the answering of RQ7 which examines the broader activity context and its influence on the activity of game creation.

Although before the project began the pupils' English teacher agreed to support the game creation project with activities during English lessons, time constraints meant that she was not able to allocate lesson time to game specific activities. The English teacher reported that she discussed the game creation project briefly with the classes in an English lesson and encouraged pupils to think about the work they had been doing on myths when they were developing ideas for their games. She also visited one IT class when the pupils using the basic game creation toolset were working, and was due to attend a lesson with the other group but was not able to get a cover teacher to allow this. In discussions with the English teacher at the end of the project, she admitted that she had not been convinced about the potential for game creation to improve writing skills at the beginning of the project, which may have had an impact on the extent to which she felt able to give up class time to support the activity. However, she explained that by the end of the project she had begun to see the benefits of the activity, and asked whether she could be more fully involved in a project the following year.

The ICT teacher was enthusiastic about the project and gave her full support, but she was not at all confident with the technology, and did not take on the role of expert as the project continued as the teacher we worked with the previous year had. She was able to offer help with some of the more basic toolset functions, and general discussion of game ideas, but she said that she was completely lost when it came to writing interactive conversations and scripting. She noted that some of the pupils were quite far ahead of her on certain aspects, but recognised that this was potentially a very positive thing.

Both classes showed enthusiasm and interest on the first session. There was something of a buzz about the project, and some had been told about the project by pupils from the year above who had previously taken part in game creation projects during the design phase.

During the first session, two pupils in the Toolset asked whether they had to base their games on Jason and the Argonauts, the myth they were studying prior to writing their own myths in English. I spoke to both classes about this, and encouraged pupils to use ideas from their own myths, unless they already had other ideas for the stories of their games, but told them that they were free to choose what their game should be about. I explained that the work they had been doing in English was relevant, because lots of characteristics of good myths such as having a hero, a quest, a journey, enemies and helpers are important in making a good game too.

The video demonstrations worked quite well in general, although sometimes pupils got distracted and did not pay close attention. In one session with each class two demonstrations were given, but this seemed to be too much for the concentration levels of the pupils, and in each group there was some disruption and signs of boredom during the second demonstration. With 50 minute lessons and time taken away at the start and end of the class there was not

always as much time as we had hoped for the content and activities. However, demonstrations did provide a good focus for the sessions. In some class sessions, particularly later in the term, there was no demonstration planned, and these classes seemed to have less purpose than others.

There were regular requests to re-explain content from the demonstrations, particularly for the more complex design activities such as creating areas transitions and scripting complex events. The option to watch back videos later did not seem to appeal, and was rarely taken up by any pupils. There was a definite preference for a personalised explanation from a helper, targeted at the specific problem a given pupil was having. This is something it is very hard to provide for a class of nearly 30 pupils, even with 2-3 researchers providing support in addition to the class teacher. There is also a danger that more confident pupils get more help, as they are quite happy to make loud and regular demands for help, unlike more quiet pupils. We tried to counteract this by moving around the classroom regularly and asking all pupils how they were doing and whether they needed help, but it was rare to have more than a short period of time before more vocal requests for help were made.

As could be expected, each class had a different atmosphere and there were also pupils in each group who required additional support. In the Toolset NT class, one boy was identified by the teacher as having ADHD and an autistic spectrum disorder. Three or four other pupils had milder behavioural issues and caused distraction for those seated around them. There was often disruption in this class, with one or more pupils being sent from the classroom on a number of occasions. This disruption sometimes spread to the rest of the class, particularly if there was commotion during the tool demonstrations as this caused the whole class to lose concentration.

In the Basic Toolset class, two pupils had very low literacy levels, and between them had a support worker for most of the sessions. These pupils made some progress with the toolset, but did struggle more than most and relied on their support worker to type in most of the text required in their games. They worked quietly in general, and did not cause any disruption to the rest of the class. Overall, there were fewer disruptions in the Basic Toolset class, and no pupils were asked to leave the classroom in any of the sessions. There was generally a calmer and more focussed atmosphere in this class.

The Basic Toolset class carried out some of the character planning and plot diagramming tools on paper. They all spent some time on the tasks, but some went back to the toolset quite quickly.

There was some evidence that timetabling issues had an effect on the atmosphere and attitude of the classes. The Toolset NT class had a regular lesson which came after a PE lesson, and on these days they often arrived late, a few at a time rather than all together, and many of them were more boisterous than usual. Another of their lessons was after lunch, which resulted in a similar but milder effect.

There was also a technical problem with a video for the NT Toolset class, which resulted in them being one session behind the other class for the duration of the term. Additionally, during one of the sessions for this class, a number of the computers had display problems, and at least three pupils were not able to work on their games for the whole session. There were some other isolated technical problems where individuals from both classes suffered crashing problems with their games, as we have experienced in other settings.

Some pupils from both classes came back after school to do extra work on their games. The most frequent of these were a group of three girls in the Basic Toolset class who were friends. In each class there was a small group of pupils who continued to be highly motivated by the game creation activity, and were happy to persevere when problems occurred. However, many pupils seemed to find problems hard to recover from, and setbacks seemed to quite easily dampen the motivation and enthusiasm levels. In contrast to previous workshop settings, there was less of a willingness to engage with a problem and debug problems within the game.

The observation notes document a few cases observed by different researchers where a pupil had implemented some behaviour in their game (such as a conversation, or an area transition) which had not worked exactly as they wanted it to, leading to them seeming quite deflated. There was a definite lack of confidence in some pupils in their ability to fix issues. Requests for help following setbacks often involved the pupil wanting an immediate answer and fix, with a reluctance to engage in a problem solving process themselves. With some one-to-one work and discussion it was usually possible to persuade these pupils to investigate the issue and engage in the required problem solving. Unfortunately, one-to-one time is quite hard to provide in a classroom setting with pupil numbers approaching 30.

Play testing provided a good focus for both classes, and there was a noticeable push to try and get the games ready for someone else to play in the session. For some pupils this meant fixing things that were not working, such as area transitions, but others were more concerned about narrative elements and how the game would make sense to the player.

Timetable disruption and absences at the end of the term caused some issues for gathering survey responses. The class using NT were given time during their final lesson to fill out the survey, and with absences 23 of the 27 pupils completed it. The class using the basic toolset had time scheduled during their final class to complete the survey, but at the last minute this class was cancelled due to a sports afternoon, so instead they were encouraged to come to a special session on the last day of term to fill out the survey. This led to a lower completion rate for the basic toolset class, with 17 of the 29 pupils filling out the survey. There may have been a selection effect for the responses from this class as pupils who did fill it out voluntarily left their form groups where they were watching videos and playing board games.

The majority of survey questions related to usage of the tools and the responses to these are discussed in section 5.2.2.3, but one question related to the broader activity context and is addressed here. Pupils were asked whether they had used ideas from the myths they wrote in English lessons in their game. 71% of basic toolset users and 52% of NT users said that they did not use any ideas from their myths, with 18% and 35% respectively saying that they used some ideas. 12% of basic toolset users and 13% of NT users reported that they used lots of ideas from their myths. The responses, shown in Figure 5.1, indicate that a higher proportion of people in the Toolset NT group used ideas from their myths as part of their games. However, a Mann Whitney U Test showed that this difference was not significant ($U=163$, $Z=-1.02$, $n=40$, ns).

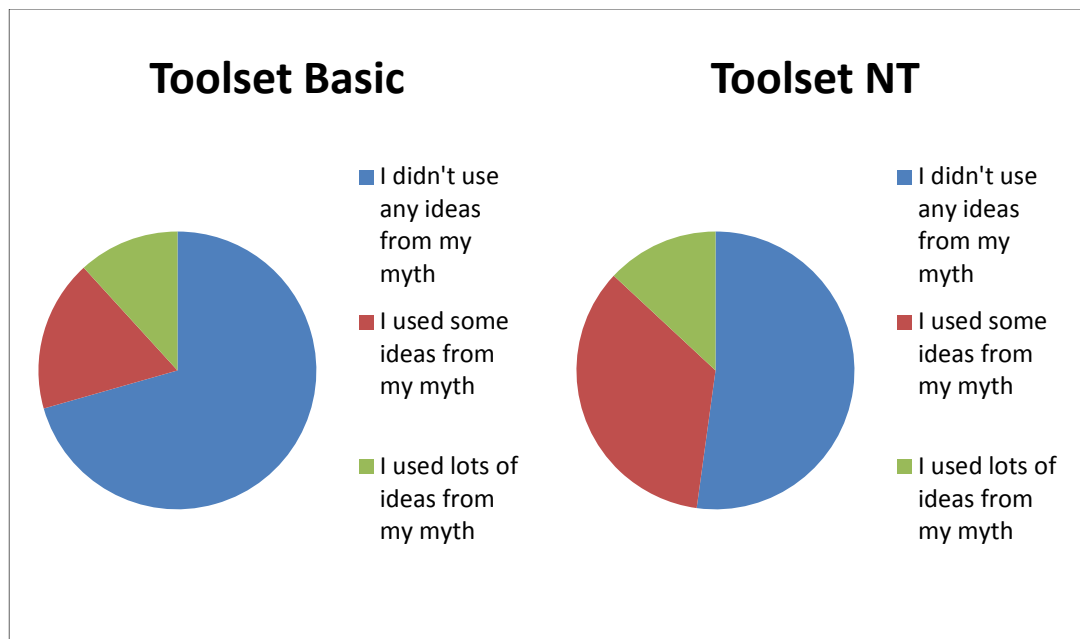


Figure 5.1: Use of myth ideas in games

5.2.2.2 Writing Ability

To examine whether narrative-based game creation leads to any measurable improvement in general writing ability (RQ2) and whether the additional representational support in Narrative Threads leads to any greater improvement in writing ability (RQ6), I collected data about the English ability levels in both game-making classes, and two other classes of comparable size within the same year group.

The data was in the form of National Curriculum (NC) levels routinely assessed by the school at the end of each term. This is an established way of recording writing ability which teachers are experienced in using. The levels were assessed by the classes' English teachers (the two gamemaking classes shared an English teacher and the two other classes shared another teacher). Both reading and writing levels were collected, to allow me to examine whether any changes were specifically related to writing, or were more general improvements in English ability.

The assessment guides for NC levels, complete with level descriptors, are in Appendix B.3. The levels are ordinal rather than interval, since they are based around awarding a numerical level along with a modifier of ‘Low’, ‘Safe’ or ‘High’ (indicated by c, b or a respectively). However, there is a metric available for calculating points scores from the sub levels to assist in statistical analysis of the NC data. The level lookup is shown in Table 5.2 and more details about this conversion table are available in Appendix B.4. The corresponding point scores were used in the data analysis and are the figures used in the results presented here.

Table 5.2: NC Points Conversion Table

Level	1c	1b	1a	2c	2b	2a	3c	3b	3a	4c	4b	4a	5c	5b	5a	6c	6b	6a	7c	7b	7a	8c	8b	8a
Point score	7	9	11	13	15	17	19	21	23	25	27	29	31	33	35	37	39	41	43	45	47	49	51	53

First, the data prior to the game creation project is considered. Figure 5.2 shows the distribution of the different groups visually¹, and shows the descriptive data for the four classes. The game making groups had very similar median levels of writing (25.62 Toolset Basic, and 25.15 Toolset NT), but the Toolset Basic class had a much larger standard deviation (5.48 compared to 3.25 in the Toolset NT class). In the Toolset Basic class there were two pupils with very low writing levels who received additional support in lessons. There was also a group of pupils with writing levels much higher than the class median. Both classes rated slightly lower on writing scores than the two comparable classes, as shown in Figure 5.2.

Next, in order to examine whether game making could improve the development of writing skills, and whether the augmented toolset could improve them further, the writing levels of pupils were examined at the end of the game making project and compared to those collected before the project. The descriptive statistics for each of the four classes are shown in Table 5.3.

¹ Box plots in this thesis show the minimum and maximum data points through the whiskers, with the top and bottom of the boxes indicating the 75th and 25th percentile and the central line indicating the median.

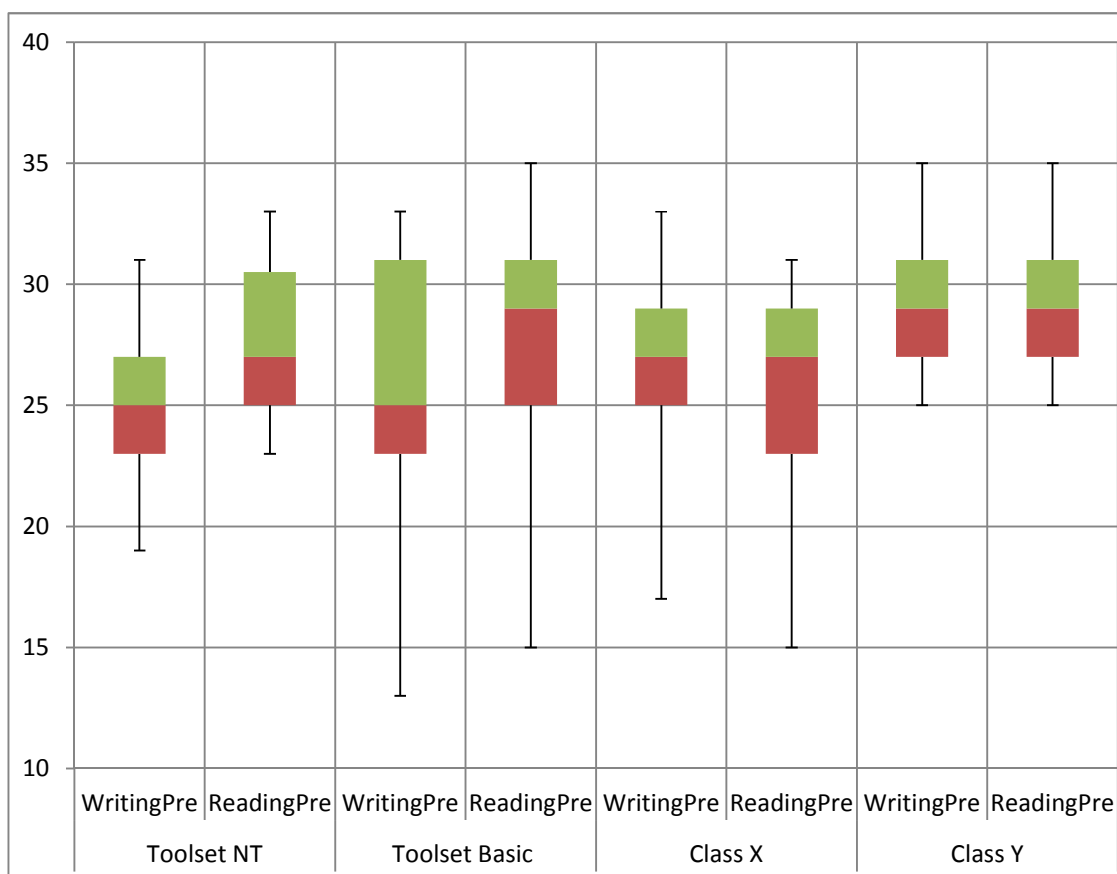


Figure 5.2: Prior Writing and Reading Levels for four year 7 classes

Table 5.3: Descriptive data for the four classes

		Mean	Median	Variance	Std. Deviation
Reading Pre	Toolset NT	27.69	27.00	10.54	3.25
	Toolset Basic	27.48	29.00	27.90	5.28
	Class X	26.26	27.00	19.12	4.37
	Class Y	29.07	29.00	10.42	3.23
Reading Post	Toolset NT	28.23	28.00	10.90	3.30
	Toolset Basic	27.97	29.00	30.18	5.49
	Class X	26.56	27.00	21.95	4.68
	Class Y	28.86	29.00	9.41	3.07
Writing Pre	Toolset NT	25.15	25.00	10.54	3.25
	Toolset Basic	25.62	25.00	30.03	5.48
	Class X	26.48	27.00	15.57	3.95
	Class Y	28.93	29.00	9.57	3.09
Writing Post	Toolset NT	26.23	25.00	12.50	3.54
	Toolset Basic	26.17	27.00	30.72	5.54
	Class X	26.70	27.00	17.75	4.21
	Class Y	29.34	29.00	9.73	3.12

Figure 5.3 shows pre and post writing levels for each class. Both game making groups showed improvement on median writing levels, whilst both non-game making groups did not show an improvement over the same period.

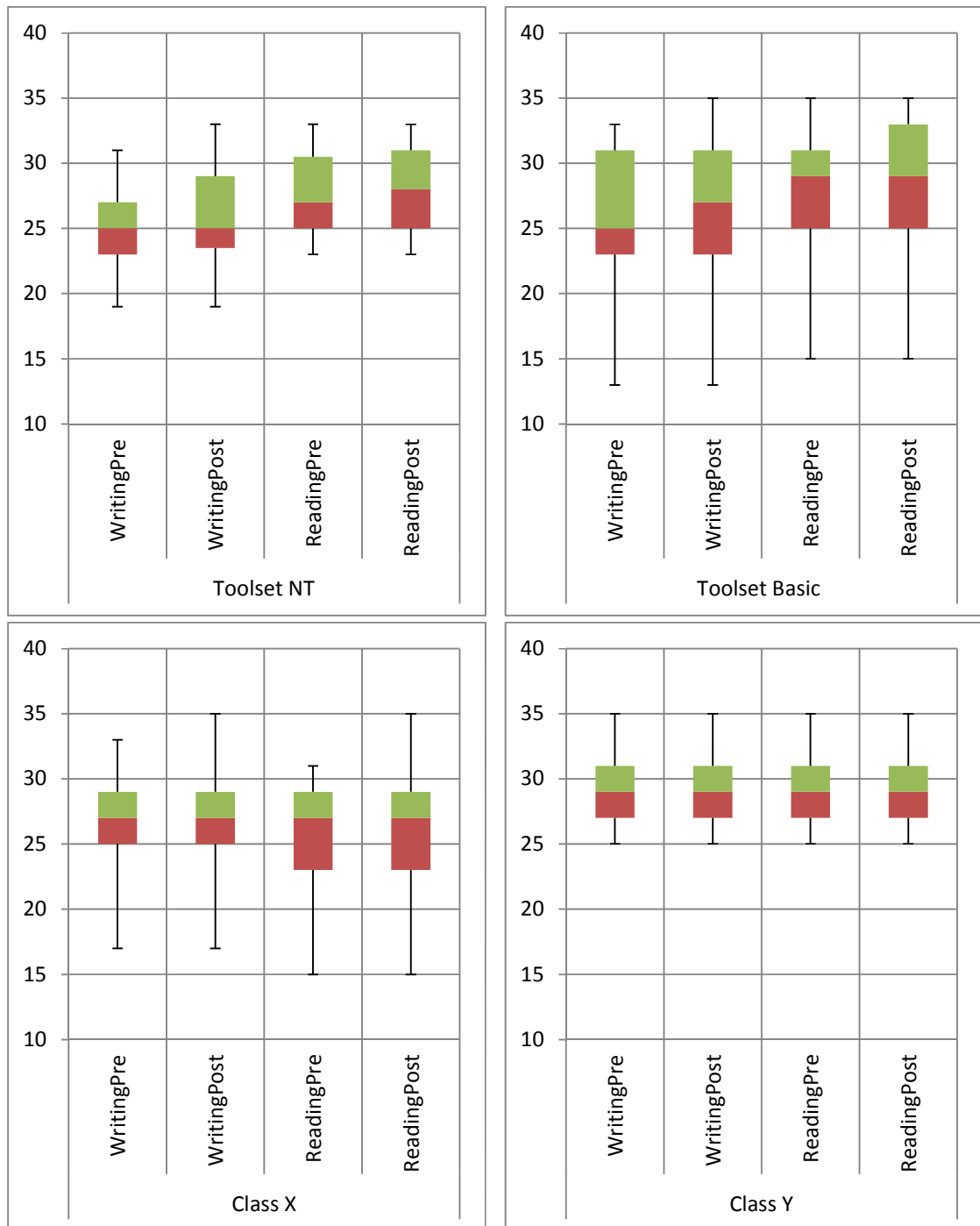


Figure 5.3: Writing & Reading Levels for 4 Year 7 Classes before and after Gamemaking Project

To examine whether the improvement levels of the classes were significant, statistical tests were conducted. As the NC level data is ordinal, parametric tests were not appropriate. For this reason, Related-Samples Wilcoxon Signed Ranks Tests were run on the pre and post writing

levels for each group. This allowed examination of whether the median of differences between the pre and post scores for each category was equal to zero in each of the four groups.

Table 5.4: Related-Samples Wilcoxon Signed Ranks Tests for Pre and Post Writing and Reading for all Classes²

			Wilcoxon Signed Ranks Test			
Group	Type	N	Test Statistic	Z	r (Effect Size)	Asymp. Sig. (2-tailed)
<i>Toolset NT</i>	Writing Pre	26	66	3.21	.44	.001***
	Writing Post	27				
	Reading Pre	26	15	2.12	.29	.034*
	Reading Post	27				
<i>Toolset Basic</i>	Writing Pre	29	36	2.83	.37	.005**
	Writing Post	29				
	Reading Pre	29	28	2.65	.35	.008**
	Reading Post	29				
<i>Class X</i>	Writing Pre	27	6	1.73	.23	.083
	Writing Post	27				
	Reading Pre	27	6	1.63	.21	.102
	Reading Post	27				
<i>Class Y</i>	Writing Pre	29	58.5	1.73	.24	.083
	Writing Post	29				
	Reading Pre	29	20	.83	.11	.405
	Reading Post	29				

* sig at .05

** sig at .01

*** sig at .001

The Wilcoxon Signed Rank Tests indicated that there was a significant improvement for pupils in the two game making classes, on both writing and reading levels, as shown in Table 5.4. The two other classes did not show a significant improvement over the course of the same period of time.

² Pre data was missing for one pupil in Toolset NT

The next goal was to investigate whether the additional support in Narrative Threads brought additional benefits for the improvement in writing and reading ability. To examine this question the reading and writing change for each pupil was calculated. Figure 5.4 shows the mean change in reading and writing for each of the four classes. As can be seen, there was a trend for the Toolset NT group to improve more on writing than the Basic Toolset group.

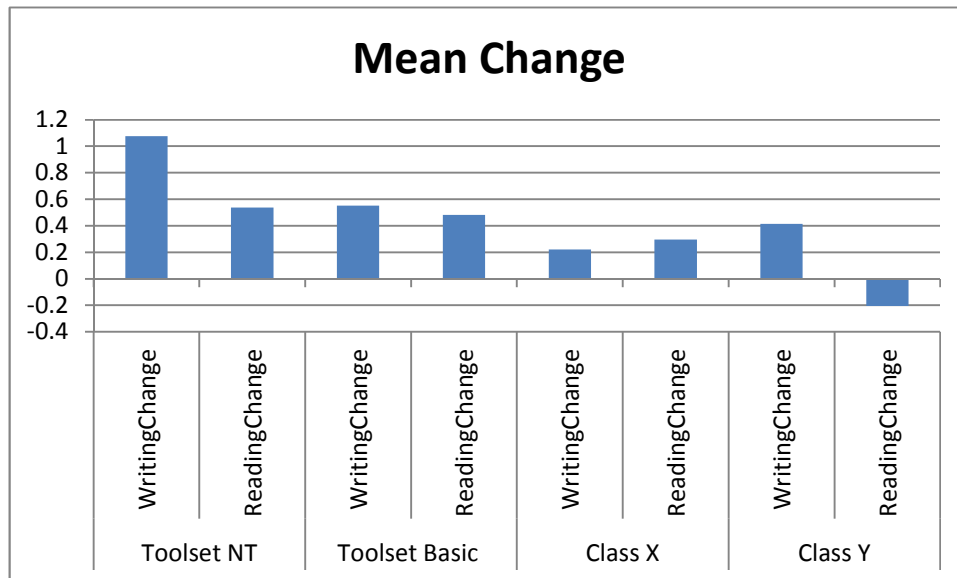


Figure 5.4: Mean Change in Writing Levels across Classes

To test whether the improvement was significantly different between the two game making classes the reading and writing change for each group of pupils was calculated, and Independent Samples Mann Whitney-U tests were used to examine the extent to which the median reading and writing change differed. There was no significant difference in writing change ($U=317.5$, $Z=-1.21$, $n=55$, ns) or reading change ($U=362$, $Z=0.35$, $n=55$, ns).

5.2.2.3 Usage of Narrative Threads

To explore how Narrative Threads was used by participants (RQ4), I looked at observations relating to use of the tools survey and interview responses, and examined the NT log data and module statistics. The module statistics also served as a first step in examining the differences between games created by the Toolset NT and Basic Toolset groups (RQ5).

5.2.2.3.1 Log Data

Log data was collected to further explore how Narrative Threads was used by participants. NT recorded the time spent by participants on different activities using the Narrative Threads tools, including the frequency and duration of use, and the key actions carried out within each tool. The mean time spent using Narrative Threads per pupil was 48 minutes, of a potential 7.5 hours spent on the project (roughly half of this time was spent on active work within the toolset, and the other half was spent watching demos and carrying out related tasks). Table 5.5 shows descriptive data for usage of the different tools within Narrative Threads, and the total usage.

Table 5.5: Log Data – Time Spent Using Narrative Threads Tools in Classroom (hours:mins:secs)

	Using Character Creator	Using Item Creator	Using Placeable Creator	Using Door Creator	Adding Important Objects	Using Narrative Diagram Tool	Total Narrative Threads Usage
<i>Total over all participants</i>	15:58:33	0:41:32	0:38:05	0:41:42	2:10:08	1:42:09	<i>21:52:09</i>
<i>Mean per participant</i>	0:35:30	0:01:32	0:01:25	0:01:33	0:04:49	0:03:47	<i>0:48:36</i>
<i>Standard Deviation</i>	00:20:14	00:02:23	00:02:44	00:02:13	00:05:36	00:03:25	<i>00:23:08</i>
<i>Min.</i>	00:05:51	00:00:00	00:00:00	00:00:00	00:00:00	00:00:00	<i>00:18:47</i>
<i>Max.</i>	01:28:52	00:08:48	00:11:07	00:09:27	00:26:04	00:10:57	<i>01:43:21</i>

Figure 5.5 shows the distribution of the total time spent between the different tools. As can be seen, the character creator was by far the most frequently used tool. All participants used it at least once, with a mean of 11.33 uses and 4 unique characters created per pupil. There was a mean of 0.40 character descriptions written per pupil and 0.14 back stories. A mean of 8.48 strength and weakness cards were used, and 1.33 custom cards created.

The logs indicated that the other creator tools (door, placeable object and item wizards) were not as widely used. A mean of 4.14 other objects were created using the tools in the school setting, and on average 0.33 descriptions were written for these objects.

The logs show that the augmented map view was scarcely used, with only five pupils ever switching it on. The narrative diagramming tool was used an average of 1.44 times per pupil, with an average of 6.37 links, 4.33 scenes and 0.85 custom scenes created per person and an average of 1.51 updates to the diagram.

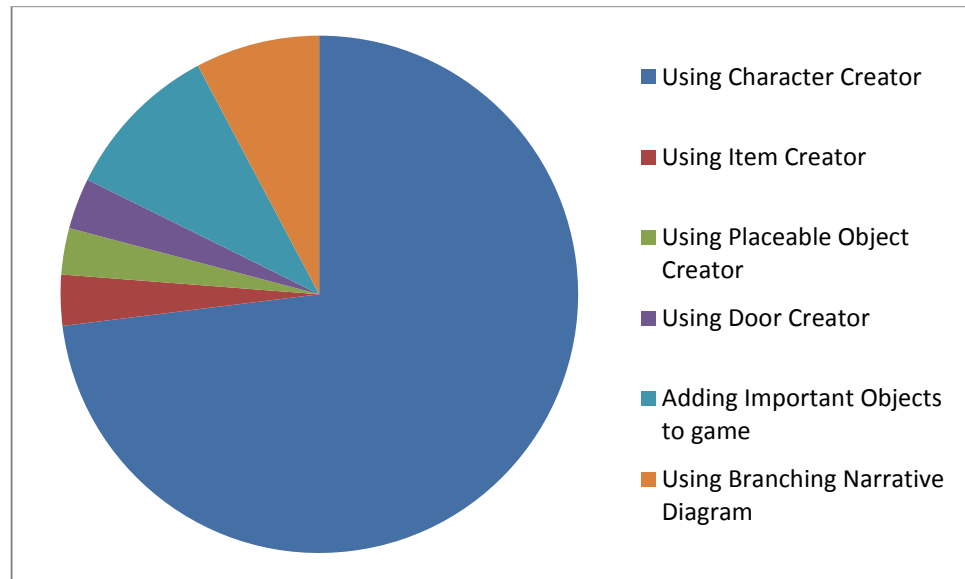


Figure 5.5: Narrative Threads Tool Usage in Classroom

5.2.2.3.2 Observations and Interview Responses.

In keeping with log findings, researchers observed that the character creator tool was widely used. In general, participants needed little help with it and seemed to find it easy to use, but it was noted that one or two pupils had difficulty with the descriptive language used on the strengths and weakness cards. One researcher had to explain the definitions of some of the terms used, such as ‘unappealing’. Interviews with the participants also suggested that the character creator was well-used and well-liked. All participants said that they used it and had found it useful. One participant reported having trouble finding the right strength and weakness cards to use, but in general, participants reported finding the tool easy to use, and three participants mentioned having created their own strengths and weakness cards. When asked which screens they had used the most, the majority of participants referred to the basics screen, and a number of interviewees said that they had also regularly used the strengths and weaknesses, relationships and appearance screens.

Participants were not regularly observed using the other creator tools. Observation notes indicated that participants in both groups were more likely to use the inbuilt drag and drop creation method to add elements such as doors, inventory items and placeable objects. It was also noted that these elements were less likely to be important to the narrative than characters. Interviews with participants backed up the logs and observation notes, with most participants explaining that they did not find a need for the other creator tools often.

Observers noted that the branching narrative diagram was widely used in the session following the demonstration of the tool, and there were a number of pupils who went back and forth between the diagram and other game creation tasks within the session. In contrast, when the Toolset Basic class worked on their paper versions of the branching narrative diagram, this

behaviour of returning to the diagrams was not observed. One pupil had difficulty connecting up her scenes in the diagram. It emerged that it was not clear to her that scenes had a beginning point and an end point, and that this had led to her trying to connect to scene end points together. A number of pupils using the tool were asked to explain their diagram to researchers, and in most cases pupils showed a good understanding of the tool and the diagram's representation of the plot. There were also a small number of pupils who created their own custom scenes within the diagram. However, after the initial session on using the diagramming tool, we only observed sporadic uses by a relatively small number of participants.

In interviews, one participant said that he found the diagram tool useful, and went back to it a few times after the first use. Some of the participants seemed to comprehend the purpose of the diagram, but one interviewee said she did not understand the diagram, so had simply connected up the scenes in whatever way she liked. Similarly, another interviewee said she found the diagram hard, and kept finding scenes which did not suit her story and was not sure where to put them. One participant said that she forgot how to use the diagram after the first use, another similarly commented that he forgot how to update it and could not work out how to get back to it. Two other pupils said that they used the diagram once, but did not find it useful so did not go back to it. Another participant said that her computer had crashed whilst she was using the diagram so she did not use it again. There were also some usability issues reported, with one participant saying that he had trouble making the connections on the diagram.

As indicated by the log files, the story icon augmented map view was scarcely used, and the observations backed this up. This tool was introduced in a short demo towards the end of the session where the narrative diagramming tool was introduced, and observation notes show that pupils were very restless during the video. In interviews there was very little recognition of the screen shots of the story icon view, with most pupils saying that they did not remember being shown the tool and had not used it.

5.2.2.3.3 Module Statistics

To explore whether the usage of Narrative Threads had led to any difference in the overall usage of the game creation toolset (RQ4) and begin examination of the differences between games created by the Toolset NT and Basic Toolset groups (RQ5), I built an automated module analysis tool to allow production of a set of key statistics about each module created by participants. The tool was written in C# and implemented as an add-on to the NWN2 toolset. Figure 5.6 shows the mean scores for each category measured.

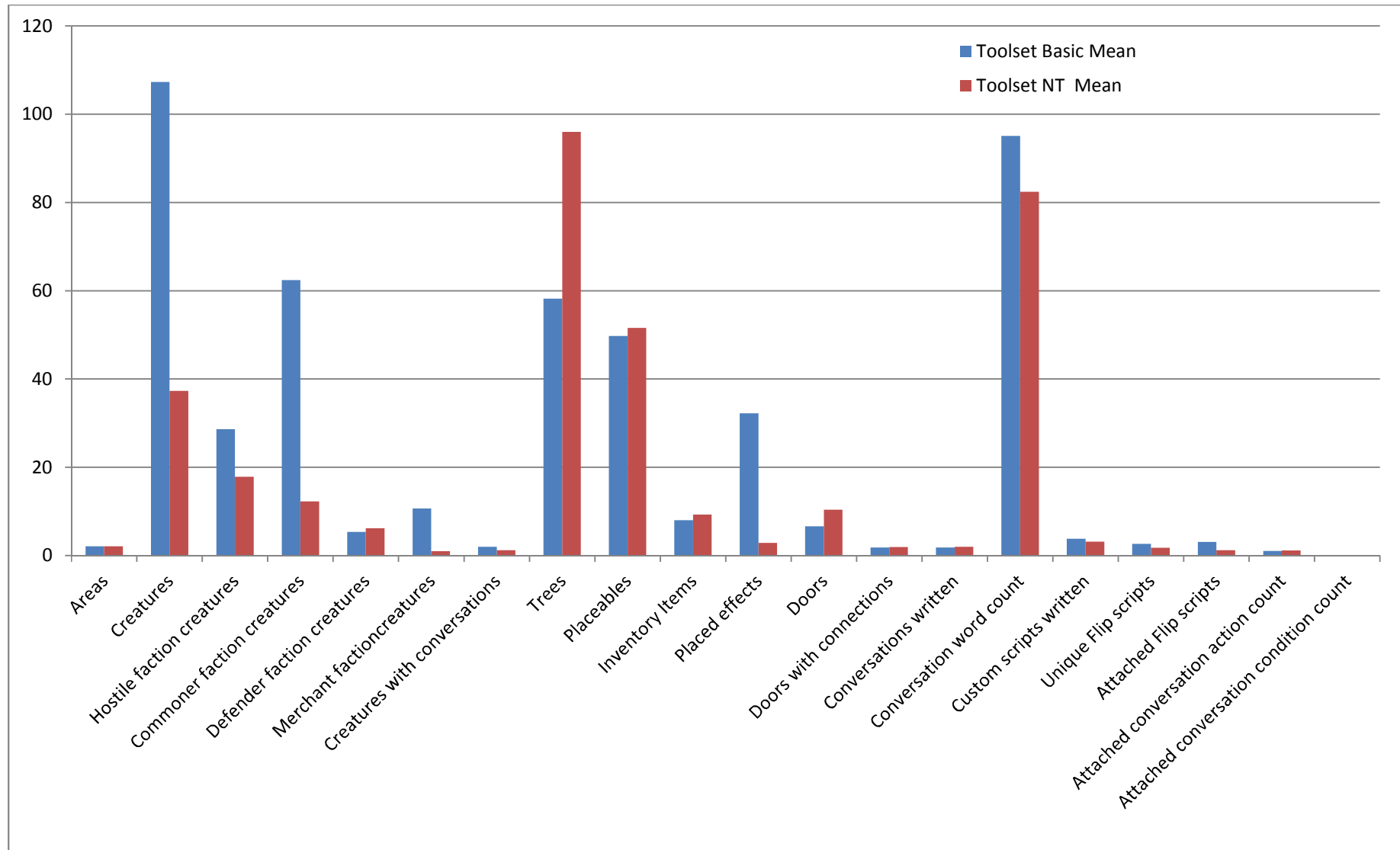


Figure 5.6: Module Statistics – School Study

There were some trends for interesting differences in the data. The Toolset Basic group appeared to have added more than double the number of creatures and placed effects to their games compared to the Toolset NT group, whilst for trees the trend was reversed. Statistical tests were carried out to check whether there were significant differences in any of the categories. Tests of normality showed that the data was not normally distributed in any category, so Mann Whitney U Tests were carried out on the scores (see Appendix B.5 for full Mann Whitney U results).

On most categories within the module statistics there is no significant difference between the two classes. The exceptions to this are total number of creatures ($U=203$, $Z=-2.62$, $n=53$, $p < 0.01$) and total number of placed effects ($U=188.5$, $Z=-3.30$, $n=53$, $p < 0.01$); on both of these categories the Toolset Basic class created over double the number of those using the NT Toolset.

5.2.2.3.4 Survey Results

A number of the questions in the online survey were designed to gather further data to contribute to answering RQ4. This addressed the way that the additional interface support was used by young designers and examined whether the support changes the way the tool was used overall, including motivational aspects. The full list of questions can be found in Appendix B.6. As mentioned in 5.2.2.1 absences and timetable disruption at the end of term meant that 23 of the 27 Toolset NT pupils and 17 of the 29 Toolset Basic pupils filling out the survey. Figure 5.7 shows the results of the questions relating to tool usage and enjoyment of the activity.

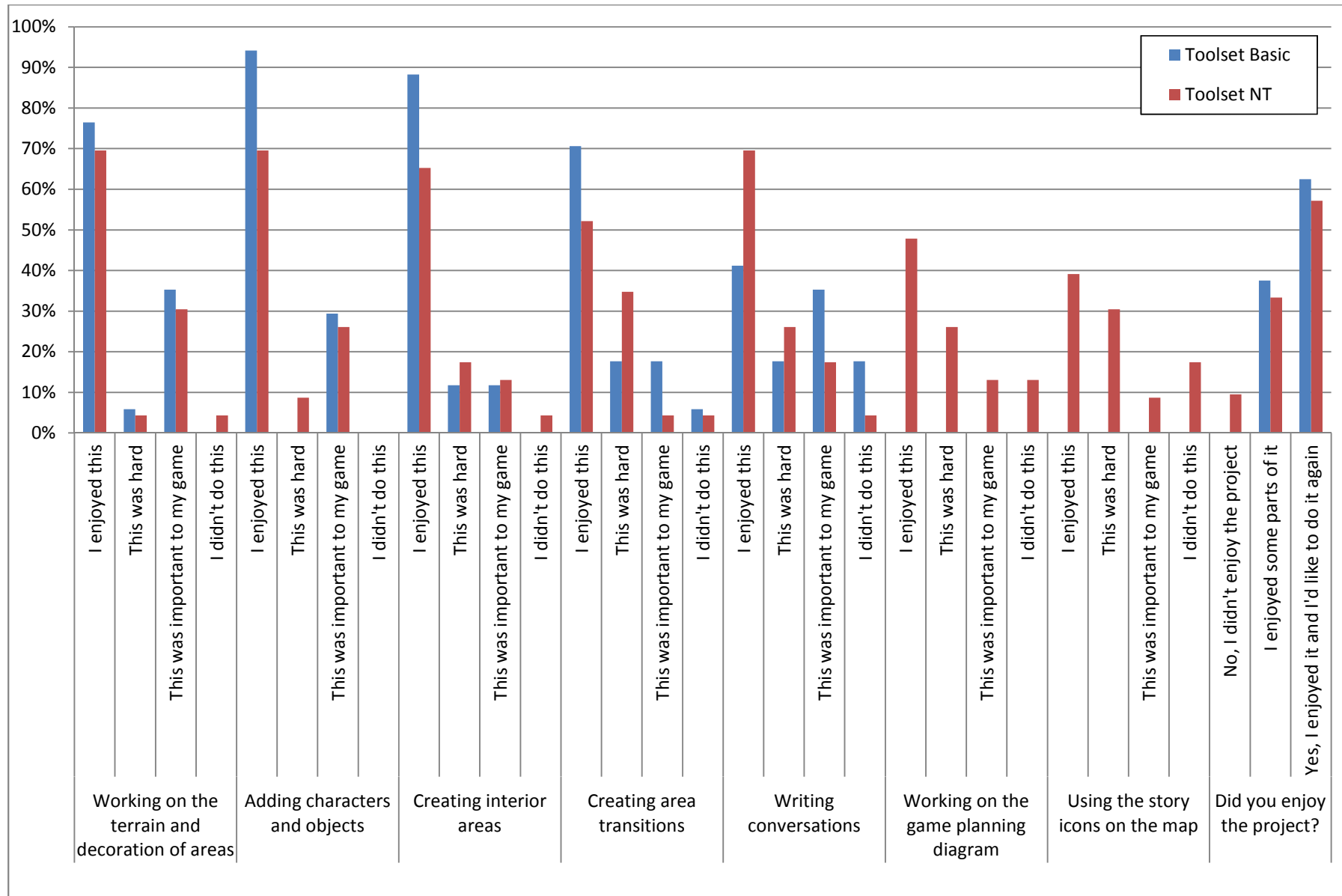


Figure 5.7: School Study Survey Results

There were some potentially interesting trends in the data. Although Mann Whitney U tests showed that none of the differences were significant (see Appendix B.7 for the results table), the trends are discussed here.

One question of key interest was the overall enjoyment of the project. 63% of basic toolset users and 57% of the NT toolset users said that they enjoyed the project and would like to do it again. 38% of the basic toolset group and 33% of the NT users agreed that they enjoyed some parts of the project. None of the group who used the basic toolset said that they did not enjoy the project, whilst 10% of the NT toolset group chose this option.

On most of the individual questions which asked about enjoyment of various activities, slightly more pupils from the group using the basic version of the toolset said that they enjoyed activities. 76% of pupils in the basic toolset class said they enjoyed working on the terrain and decoration of the areas, where 70% of the pupils in the NT class said the same. When it came to adding characters and objects to the game 94% of basic toolset users said they enjoyed it, whilst 70% of NT users said the same. 88% of basic toolset users enjoyed creating interior areas, compared to 65% of NT users. When it came to creating area transitions, 71% of basic toolset users and 52% of NT users said they enjoyed it. The trend reversed quite substantially for writing conversations, however, with 42% of basic toolset users saying they enjoyed the task and 70% of NT users saying the same.

When asked about enjoyment of the two NT specific activities, 48% of users enjoyed working on the game planning diagram and 39% reported enjoying using the story icons on the map.

When asked whether activities were hard, few pupils reported this to be the case. 6% of basic toolset users reported that they found working on the terrain and decoration of the areas to be hard whilst 4% of NT users said the same. No basic toolset users found creating character and objects to be hard, but 9% of NT users did. 12% of basic toolset users found creating interior areas to be hard, compared to 17% of NT users. 18% of basic toolset users found creating area transitions hard and 35% of NT users said the same. 18% of basic toolset users found writing conversations to be hard and 26% of NT users reported finding this hard.

26% of NT users reported finding using the game planning diagram hard, and 30% said that using the story icons was hard.

Regarding the importance of individual activities to the game creation process, the basic toolset users rated most activities as being of slightly higher importance than the NT users did. 35% of basic toolset users felt that working on the terrain and decoration of areas was important to their game and 30% of NT said this. 29% of basic toolset users and 26% of NT users felt that adding characters and objects was important to their games. When asked about creating interior areas 12% of basic toolset users and 13% of NT users felt it to be important, with the figures at 18%

and 4% for creating area transitions. Writing conversations was felt to be important by 35% of basic toolset users and 17% of NT users.

When asked about the importance of the two NT specific activities 13% felt that working on the game planning diagram was important to their game and 9% reported that using the story icons on the map was important (a surprising response given that very few pupils used these icons, according to the logs).

A small number of users reported that they did not engage in specific activities. 0% of basic toolset users and 4% of NT users said they did not work on the terrain and decoration of areas. No users in either group reported failing to add characters and objects to their game. 0% of basic toolset users and 4% of NT users said they did not create interior areas, and the figures were 6% and 4% for creating area transitions. When it came to writing conversations 18% of basic toolset users said that they did not engage in the activity, whilst only 4% of NT users said the same. 13% of NT users reported not using the game planning diagram, and 17% said they didn't use the story icons.

5.3 Vacation Workshop Study

The vacation workshop study, conducted in October 2010, allowed examination of RQ2, RQ4, RQ6 in a smaller workshop setting which supported a more in-depth investigation of the game creation activity and allowed participants more intensive time to work with the tools. Some minor changes were made to the story icons augmented map view before the vacation workshop study, given that it was scarcely used in the school study. The icons were improved to make them more aesthetically pleasing (the two sets of icon versions are shown in Appendix B.8). Additionally, it was decided that, given its status as a background tool which subtly gives information about the location of story elements, the augmented map view should be switched on by default in the workshop study, although participants remained free to turn it off.

5.3.1 Method

5.3.1.1 Participants

Fourteen young people aged 11-15 took part in a game creation project during a four day half-term holiday workshop. The participants were chosen on a first-come, first-served basis as their parents contacted the author in response to advertisements placed on a website and university mailing lists, and circulated among those who had previously expressed an interest in game creation workshops.

The attendees were split into two groups before they arrived for the workshop. Individuals were allocated to the groups so as to ensure that the groups of equal size and were matched, as far as possible, for age. The groups worked in separate rooms on the university campus. Some

participants also knew each other prior to the workshop and had asked to be put in the same group, which was taken into account. Additionally, two participants who had previously taken part in game creation projects run by the researchers were divided across the two groups.

One group (1 female, 6 male, mean age = 13.14) used the NWN2 toolset with the Narrative Threads plugins (referred to hereafter as ‘Toolset NT’). The other group (7 male, mean age = 13) used the toolset without Narrative Threads (referred to hereafter as ‘Toolset Basic’). There was a clear gender imbalance, with only one of the fourteen participants being female. This was due to the decision to offer places on a first-come, first-served basis. The overwhelming majority of respondents to the adverts were male, although two more females did apply for places once the workshop was already full. It was important to the overall research approach that this was run as a workshop in line with other similar organised holiday activities, and selecting participants based on gender would have changed the nature of the activity.

5.3.1.2 Procedure

The workshop ran for four days from 10am to 4pm, with a 45 minute lunch break (although participants often finished eating within 30 mins and asked to be taken back early). Two hours were spent on an initial survey and a writing activity at the beginning and end of the project (described further in the next sub-section), meaning that each participant spent approximately 21 hours on the game creation project.

The workshop participants were given demonstrations of the key tools and functionality of the game creation toolset. As the two groups worked in parallel, it was not possible for the same person to give the demonstrations to both groups, however instructional videos were created prior to the workshop to ensure that the content presented to the two groups was identical as far as was possible, with the exception that the NT group received additional content specific to the NT features, as detailed below.

Both groups were given four demonstrations relating to the basic toolset features, two of these were the same across the groups (using the terrain editor/blueprints and playtesting) and two had alternate versions as instructions were slightly different when using NT (conversation writing and interior areas/area transitions). Both groups were also shown three demonstrations relating to a scripting tool which both classes used. The group using the NT tools received two additional demonstrations on using NT: one showing how to use the character/item creators and the story icons functionality, and one showing how to use the branching narrative diagram tool to plan their stories. The other group were given a demonstration on using the properties window to customise characters and objects in place of the former, and were also encouraged to carry out some character planning activities on paper after having been given guidance in how to do this. In place of the branching narrative diagram tool, the other group were asked to map out a branching narrative diagram for their game-stories on paper.

5.3.1.3 Data Collection

Video recordings were made of the groups at different points within the four-day workshop, primarily when one of the helpers was free and spotted an interesting discussion going on, although a particular effort was made to capture playtesting sessions. At the end of each day the two workshop leaders had a brief meeting to discuss how each group was getting on with the game creation activity, and to exchange information about any changes or alterations to planned activities. Following this meeting I wrote summary notes of the key observations for each group, and subsequently incorporated additional observations from watching back the videos.

All participants were interviewed at the end of the workshop. The semi-structured interview guide and question framework is shown in Appendix B.2. Audio recordings were made of all interviews, and these were transcribed verbatim.

In addition to the interview transcriptions, a range of other data was collected over the period of the study. In order to examine any differences in performance on a multimodal writing task at the end of the project, it was necessary to set two tasks for each participant: one at the beginning of the first day of the workshop, and one at the end of the last day. These were not matching pre and post-tests as the tasks were not analogous. As this was a naturalistic study and the participants had volunteered to take part in a game creation workshop during their school holidays it was not appropriate to set experimental tasks. It was important to ensure that tasks they were asked to carry out were purposeful, relevant to the workshop, fitted within the flow of activities, and were not repetitive.

Care was taken to design two tasks which involved multiple representational modes, were matched as far as was possible, and were appropriate to the stage of the game creation project. At the beginning of the workshop participants were asked to write a review of a game they had played recently. The review took the form of a PowerPoint presentation and participants were encouraged to include pictures and use any formatting or effects they felt would add to their review. Participants were also told that the reviews would appear as a rolling slide show in both group rooms during the workshop to inspire them to put effort into their reviews as they would be seen by their fellow participants.

At the end of the workshop participants were asked to carry out another multimodal writing task; creating the game box cover for the modules they had created during the week. They were encouraged to write a description of the game that would appeal to potential customers, include screenshots from their games to illustrate their covers. Participants were given a Word template to work with to help them with the formatting required for a DVD case cover. The template included placeholder text written about an example game, with sections for a summary of the storyline and notes on interesting characters and objects that could be found in the game. The template is shown in Appendix B.10.

The multimodal writing activities were assessed by teachers according to the national curriculum level descriptors described in Section 5.2.2.2, and the process used in this study is explained further in Section 5.3.2.2.

In addition, the game modules created by the young people were collected at the end of the workshop, along with log files of the interactions with Narrative Threads, for the group which used this tool, and key numerical information about the games created.

5.3.2 Findings

5.3.2.1 Activity Context

Here I present a summary of important observations about elements of setting and describe the way that the planned study design was carried out in the workshop setting. These interpretations are drawn from the observation notes made at the end of each day after discussions with the other workshop leaders. These observations contribute to answering RQ7, which examines the broader activity context and its influence on the activity of game creation.

All participants attending the workshop had fairly high motivation levels, as would be expected since they had self-selected to attend a game making workshop during their school holidays. The initial enthusiasm did not wane throughout the week, although there was a trailing off on the final afternoon once they had burnt their games to disc and were playing each other's games without the chance to make further changes at the workshop. Pupils from both groups were keen to return from lunch early, and on no day did we stay in the café area for the full 45 minutes allocated for lunch break as participants were very eager to get back to their games.

The groups were matched for age and previous experience as far as possible, but there were inevitably some differences between the two groups. Some participants knew each other prior to the workshop and had asked to be placed in the same group. The Toolset NT group had one pair of friends and one pair of brothers, whilst the Basic Toolset group had one pair of friends already known to each other. There seemed to be a more cohesive feel in the Toolset NT group at the start of the week. On the first day of the workshop the Toolset NT group all sat together at lunch, whilst the Basic Toolset group sat in smaller groups and were more quiet than the other group during the workshop itself. However, as the week went on participants in this group became more friendly and the sessions became a lot more noisy as group members moved around the room and discussed their games more.

In both groups there were many examples of participants helping each other and passing on skills and techniques. The Basic Toolset group in particular got more involved in helping each other as the week went on, and the participant in this group who had been to a game making workshop previously took on something of an expert role. He offered advice and help to many of his fellow group members, particularly on scripting problems.

Both groups had reasonably high ability levels and participants were quick to pick up the usage of the tools. In these smaller settings there was much better concentration during the demonstration videos, and participants were closer to the screen, making it easier for them to follow the instructions. As with the school study, the demonstrations provided a good focus for activity, and participants in the Basic Toolset group seemed to get restless on the second afternoon when there was no demonstration planned. They were scheduled to work on an analogous paper-based story planning activity whilst the Toolset NT group learnt how to use the branching narrative diagram, but they quickly grew bored of this activity and went back to working on the toolset. The workshop leader for this group felt that they did not have enough direction at this point, and elected to move forward a demo planned for the following morning as they seemed ready for learning this next step.

An imminent play testing session again provided a good focus for encouraging participants to get their games up to scratch. The play testing itself went well, and designers in each group seemed to take the task seriously and made notes on the improvements needed after watching someone else play their game. On the afternoon of the playtesting a workshop helper who had been mostly working with the Basic Toolset group visited the Toolset NT group and commented they seemed to be much more interested in the story telling aspect of the task, and said that she was hearing discussions in this group about plots which she had not heard in the other room.

The PowerPoint game review activity was well received by participants, and they seemed reasonably motivated by the activity. One participant in the Basic Toolset group missed the game review activity due to being late on the first day of the workshop. The game box creation activity, which took place at the end of the workshop was well-received by the Toolset NT group, but a number of participants in the Basic Toolset group were very reluctant to give time to the activity, as discussed further in Section 5.3.2.2.

5.3.2.2 Writing Ability

Due to the nature of the workshop set up (i.e. it was a self-selecting holiday activity, not linked to any formal school setting) it was not possible to collect data about the participants prior to their attendance. To gain an understanding of the background ability levels, participants were set a writing task upon their arrival. This activity was designed to allow us to investigate how evenly matched the groups were, and to provide a context for achievement and performance on a writing test at the end of the workshop.

Both the quantity of words written and the quality of the pieces were examined to provide a baseline measure of how generally willing participants were to write and an estimate of their level of ability. The pre- and post-tasks were not directly comparable as there were different briefs and different scopes for the two tasks, so the analysis treated the tasks separately rather

than as paired tests. In this way, although it was not possible to test whether the groups' performances changed over the course of the workshop, it was possible to compare the groups' writing performance prior to the workshop and at the end of the workshop.

First, the word counts in each task were examined to give a general measure of the participants' willingness and propensity to write. Figure 5.8 shows the mean word counts for each group on the two tasks, and Table 5.6 shows further descriptive statistics.

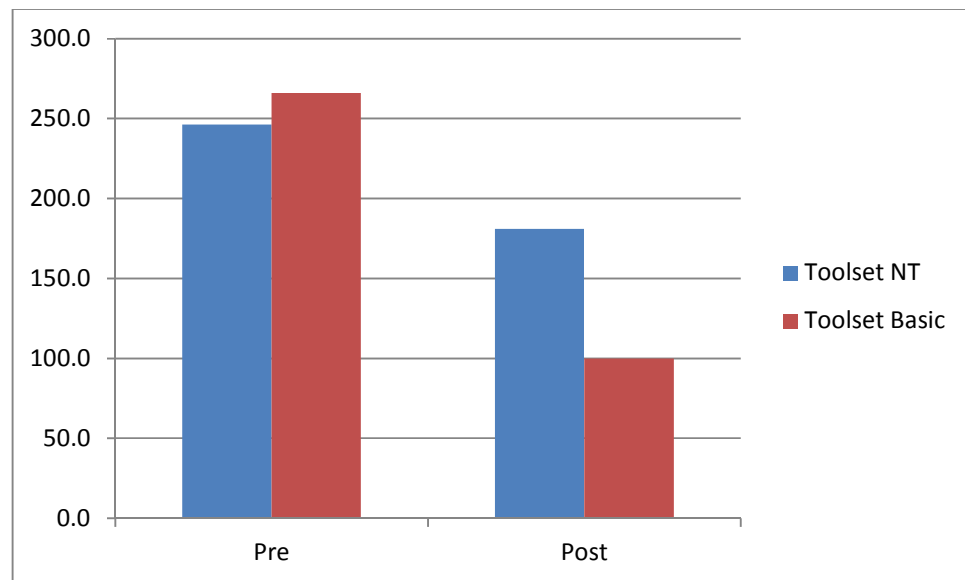


Figure 5.8: Mean pre and post word counts

Table 5.6: Pre and post word counts by group

Group	Word Count Stat	Pre	Post
<i>Toolset NT</i>	Mean	246.3	181.0
	Median	200.0	180.0
	Std. Dev.	91.4	32.2
<i>Toolset Basic</i>	Mean	266.2	99.9
	Median	242.0	141.0
	Std. Dev.	107.7	65.9

As mentioned above, given the differences between the tasks a direct comparison is not helpful, but we can consider the pre-game creation task as a baseline indicator of propensity for writing. The word count levels are quite similar on the pre-game creation task, with a trend for the Toolset Basic group to write more. However, on the post-game creation writing task the Toolset NT group wrote considerably more. As noted in the contextual observations, two participants in the Toolset Basic group put very minimal effort into completing the game box task, and these only wrote a few words.

To examine whether the differences between the word counts of each group were significant statistical tests were run. The word counts constituted interval data, so parametric tests were potentially appropriate. A Shapiro-Wilks test indicated that the data was normally distributed, and a Levene's Test showed that there was significant inequality of variances on the post test data. In line with these results a t-test was chosen, and levels which do not assume equality of variances were used. The results (shown in Table 5.7) indicated that there was no significant difference between the two groups on the pre word count, despite their being a trend for the Toolset Basic group to write more. With the post word counts however, there was a significant difference, with the Toolset NT group writing significantly more.

Table 5.7: t-test for Equality of Means between Groups on Word Counts

	t-test for Equality of Means (Equal variances not assumed)					
	N	t	df	Mean Difference	Std. Error Difference	Sig. (2-tailed)
<i>Pre word count</i>	13	.32	9.84	19.88	60.94	.75
<i>Post word count</i>	14	-2.71	8.71	-81.14	29.94	.025*

* Significant at the 0.05 level.

In order to examine whether there were any differences between the groups in terms of writing quality (as opposed to number of words written), a trained English teacher with extensive experience teaching the target age range was commissioned to mark the pre workshop exercises and the end of workshop exercises. An existing marking scheme was used, in the form of the National Curriculum assessment framework described in the previous chapter and shown in Appendix B.3, and the teacher was asked to give an overall level for each piece of work. In addition, the teacher was asked to give each piece of work a mark out of ten based on how well non-textual elements such as images, font and formatting were used to support the writing.

In order to test the reliability of the scheme and marker for these short pieces of work the full set of exercises were also marked by another trained English teacher who also had experience teaching and marking work by this age range.

As the National Curriculum level scale is ordinal rather than interval, Spearman's rho was used to assess the level of correlation between the two sets of marks. A strong significant correlation was found between the two sets of marks on the pre task ($r_s(11) = .796$, $p < 0.01$). A highly

significant correlation was found between the two sets of marks on the post task ($r_s(11) = .846$, $p < 0.001$).

Table 5.8: Descriptive data on NC levels for pre and post writing tasks

Toolset Version	Pre/Post	Mean Rating	Median Rating	Std. Dev.
<i>Toolset Basic</i>	Pre	29	27	2
	Post	21	29	13
<i>Toolset NT</i>	Pre	32	33	4
	Post	33	33	1

Descriptive data on the marks awarded by the primary rater are shown in Table 5.8. On the post task, the two game boxes which participants had done very little work on were assessed as not demonstrating the lowest level in the scheme, so received a mark of zero. Given that both of these participants were in the Toolset Basic group, the interval data for these activities could be seen to overemphasise differences between the two groups. For this reason it was important that the statistical tests used to examine the significance of the differences did not treat the ratings as interval data. Given this restriction, and given that the National Curriculum data is ordinal, Mann Whitney U tests were used to examine the difference between the two groups on each piece. Using a rank-based test such as this eliminated the large differences between the scores of those who did not change anything other than the titles (scoring zero) and those who completed the task more fully.

The test results showed that there was no significant difference between the groups on the pre writing task, despite there being a trend for work by the Toolset NT group to be marked slightly more highly ($U=8.5$, $Z=-1.85$, $n=13$, ns). On the post test, however, there was a significant difference, with the Toolset NT group being marked significantly more highly ($U=3.5$, $Z=-2.75$, $n=14$, $p<0.01$).

5.3.2.3 Usage of Narrative Threads

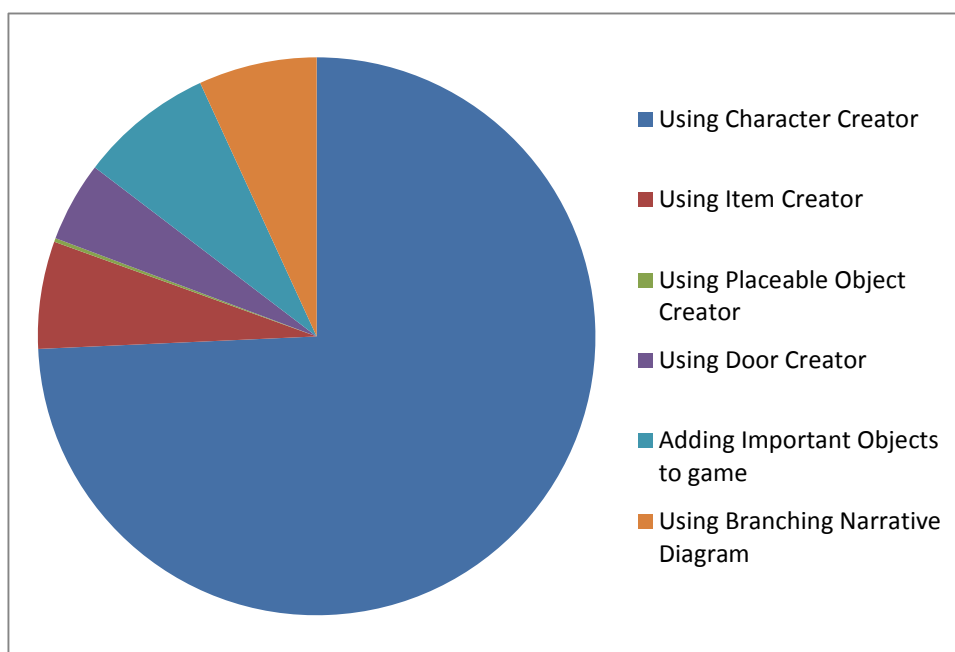
5.3.2.3.1 Log Data

Log data were collected to gather information about the usage of Narrative Threads in the group that was using this version of the software. NT recorded the time spent by participants on different tools within Narrative Threads, by taking account of when a tool was started and closed, and the key actions carried out within each tool. Table 5.9 shows descriptive data about the time spent using the Narrative Threads Tools.

Table 5.9: Log Data – Time Spent Using Narrative Threads Tools at Workshop (hours:mins:secs)

	Using Character Creator	Using Item Creator	Using Placeable Creator	Using Door Creator	Adding Important Objects	Using Narrative Diagram Tool	Total Narrative Threads Usage
<i>Total over all participants</i>	09:53:31	00:49:43	00:01:40	00:37:05	01:02:08	00:54:50	13:18:57
<i>Mean per participant</i>	01:24:47	00:07:06	00:00:14	00:05:18	00:08:53	00:07:50	1:54:08
<i>Standard Deviation</i>	00:39:17	00:08:43	00:00:29	00:03:24	00:08:56	00:05:51	00:42:55
<i>Min.</i>	00:37:25	00:00:00	00:00:00	00:00:18	00:00:26	00:01:12	01:01:26
<i>Max.</i>	02:18:19	00:26:32	00:01:25	00:10:26	00:28:05	00:19:51	03:08:06

The total mean usage per pupil was 1 hour 54 minutes, of a potential 21 hours spent on the project (although time spent on demonstrations meant that approximately 17-18 hours were actually spent on active work within the toolset).

**Figure 5.9: Narrative Threads tools usage at workshop**

As Figure 5.9 shows, using the character creator was by far the activity on which the most time was spent. There was a mean of 35.42 uses of the character creator, and on average 11.4 unique characters were created by each participant. There were a mean of 6.28 character descriptions

written by workshop participants, and 3.42 back stories. A mean of 32.7 strength and weakness cards were added to characters, and a mean of 5.28 custom strength and weakness cards were created with accompanying descriptions and property settings.

The item, placeable and door creator tools were not widely used. A mean of 6 of these objects were created per person using the NT tools, and on average 0.85 descriptions were written.

The logs showed that none of the workshop participants ever chose to turn off the augmented map view, and interview comments suggested that this was because they did not find them to be in the way and some participants actively found them to be helpful.

The branching narrative diagram tool was used on average 1.14 times per participant, with an average of 11.71 links, 8.71 scenes and 3.57 custom scenes created per person and an average of 1.43 updates.

5.3.2.3.2 Observations and Interview Data

All participants reported finding the character creator tool useful and easy to use. One participant said that he found it particularly useful to be able to scroll through appearances in the tool. A number of interviewees commented that it was particularly useful for creating the player characters. One interviewee mentioned that she eventually started to use the properties window for changing character settings, but noted that the character creator made the process easier.

One interviewee said of the character creator tool “I relied on that a lot” and mentioned the strengths and weakness cards in particular, saying that they made the process “...very easy, it’s just dragging things into... and it’s really easy to create one, you just type in a sentence and drag the bar on and choose it”. Again, as with the school interviews, participants generally reported spending most time on the basics screen or the strengths and weaknesses screens and the appearance screen was also mentioned a number of times. One participant also mentioned spending considerable time on the descriptions for the most important characters.

Through observation it seemed that the character creator tool was being used slightly less by the end of the week. However, participants still tended to use the wizard to start the character creation process, and went on to fine tune in the properties window subsequently. It seemed that having the key characters appear in the story elements panel was important to the young game designers. A bug meant that one participant lost the data for some characters she had created using the creator tool. Her characters were still visible in the game world, but the NT representation no longer showed the characters she had created. They were later retrieved, but temporarily she was quite bothered about the fact that her characters were ‘gone’.

Most participants said that they used the door creator tool a few times and found it useful.

There were also some reports of using the item creator, but no mentions of using the placeable

object creator. Observations notes indicated that in general participants were most likely to use the inbuilt drag and drop creation method in combination with the properties window to add elements such as inventory items and placeable objects.

No participants were observed turning off the story icon view, and the interviews confirmed that users were happy to keep them switched on. Some participants felt that the icons were useful, reporting that they were particularly good for diagnosing problems such as conversations and doors not properly attached. Most users said that they had not really noticed the icons, but some of these felt they might be useful for people with very large areas.

Observations of the narrative diagramming tool usage backed up the log findings. All participants used the tool after the initial introduction, some for only a few minutes, others for a longer period of time, and there were only a few sightings of the tool in use throughout the rest of the workshop.

The interviews gave an opportunity to explore why the tool was not being used extensively by these participants. One participant said that he did find the tool useful, and used it to plan out parts of the game that he had not yet implemented. He also said that he went back to use the tool again after the initial introduction, and found it easy to use. Another participant reported that he found the tool somewhat useful for planning, but did not return to it as he got distracted with fixing specific problems as he went on.

An interesting explanation for not using the tool came from one participant who said that it “...felt like it was pointing out the obvious. Because I’d already done these things when I’d been putting it together, and I had to create this sort of thing to show what I was doing”. He also noted that for planning purposes he would rather use paper, something echoed by another participant. It was clear that many participants saw it solely as a planning tool rather than also as a way of thinking about the on-going development of the plot. One young designer said that he already had a clear idea of what he wanted to do, and his plot did not include many branches so he had not needed it. Another said that she does not “really do that well with planning stuff out, personally.”

Two participants described feeling a bit confused by the branching narrative diagrams. One said that he thought this was because it was too early in the process for him and he had not yet planned out the beginning of his game. The other said that he found the tool something of an obstacle, and preferred to just keep his ideas in his head and felt that if he forgot them, then they were not that important.

5.3.2.3.3 Module Statistics

The automated module analysis tool referred to in Section 5.2.2.3.3 was again used to produce a set of key statistics about each module created by participants. Figure 5.10 shows the mean

scores for each group on each category. Tests of normality showed that the data was not normally distributed in any category, this and the small number of participants meant that non-parametric tests were more appropriate, despite the interval nature of the data.

Independent samples Mann-Whitney U Tests were carried out on the scores (see Appendix B.8 for results table). On most categories within the module statistics there is no significant difference between the two classes. The exceptions to this are total number of areas ($U=6$, $Z=-2.43$, $n=14$, $p<0.05$), the total conversation word count ($U=8$, $Z=-2.11$, $n=14$, $p<0.05$), and the attached conversation condition count ($U=7$, $Z=-2.61$, $n=14$, $p<0.001$). The Toolset Basic group created significantly more areas, but the Toolset NT group wrote significantly more words within conversations, and added significantly more conditions to conversations lines.

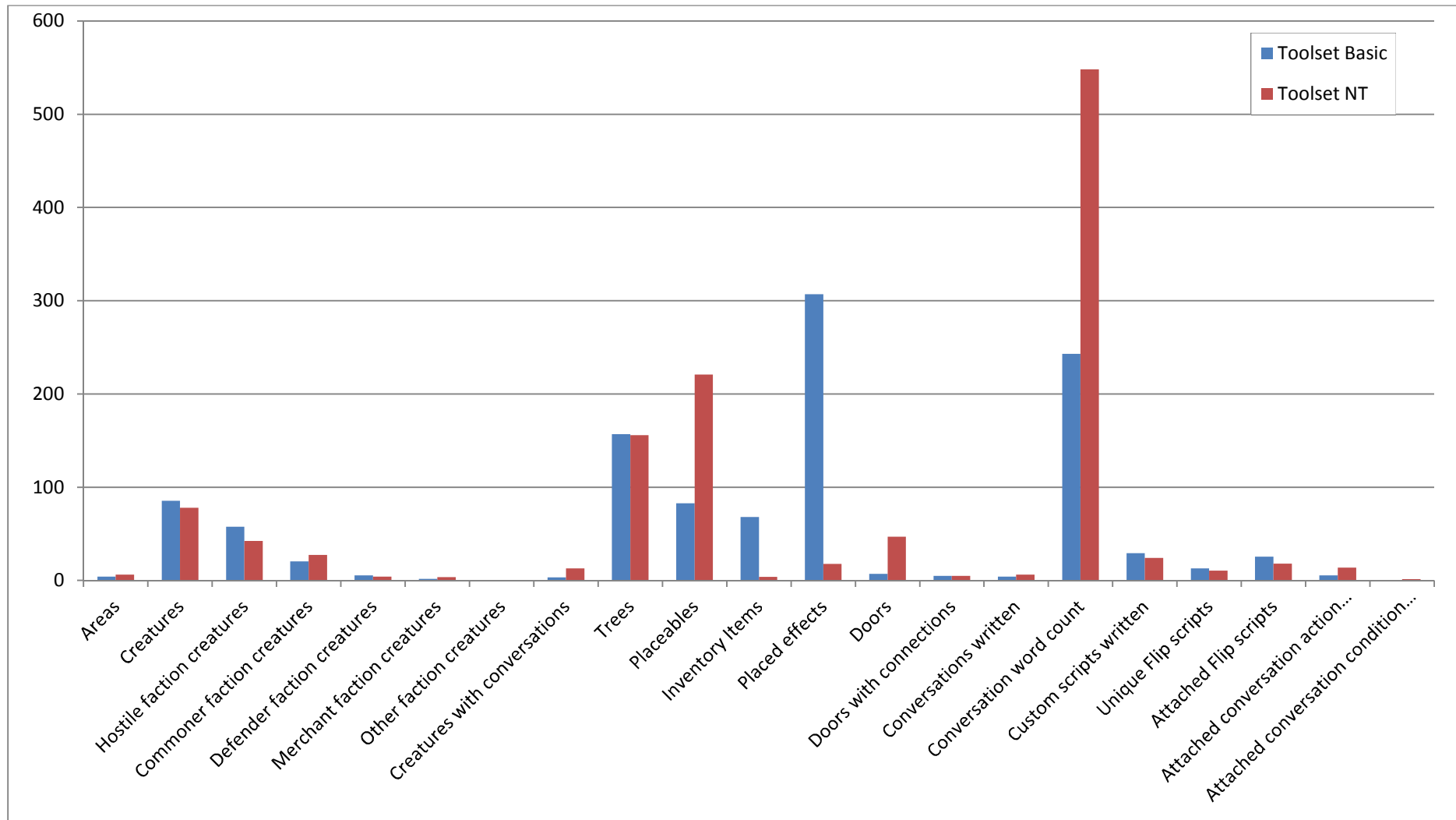


Figure 5.10: Module Statistics – Workshop Study

5.4 Discussion

The data presented in this chapter was analysed with a view to answering RQ2, RQ4, RQ5, RQ6 and RQ7. Here, each question is addressed in turn and the implications of the findings are discussed.

RQ2. Does narrative-based game creation lead to any measurable improvement in general writing ability?

The school study addressed this question. Measurements of writing ability were collected before and after the game creation project, as assessed by the classes' regular English teacher. This data showed that there was a significant improvement in writing ability from before to after the game creation project. In order to investigate whether the improvement could be due to other factors, such as general development over the course of a term, I also examined the writing levels of two classes of comparable size from the same school and year group. These classes did not show a significant improvement in writing skills over the course of the same period. This suggests that taking part in the game creation project may have led to an improvement in writing ability. However, there are some limitations to this study, and there may be other explanations for the results. The two classes taking part in game creation had the same English teacher, but the two comparison classes shared a different English teacher. This means that the difference in progress may be due to differences in their teaching of English over the course of the same time period, or to do with differences in their assessment of ability and progress.

RQ6. Does the additional representational support in Narrative Threads lead to any greater improvement in writing ability?

The school study examined this question with respect to general writing ability. The results showed that, although there was a trend for Narrative Threads users to show greater improvement in writing ability in comparison with users of the Basic Toolset, the difference was not statistically significant. The groups had the same English teacher, eliminating some of the above concerns, but there were other noticeable differences between the classes, as discussed in more detail below. Further research would be needed to determine whether or not this trend reflected a real difference.

The workshop study examined this question in the context of writing ability as demonstrated on tasks more closely related to the game creation project. Participants who had used Narrative Threads were marked significantly more highly on a multimodal writing task completed at the end of the game creation project than participants using the basic version of the toolset. Given that there was no significant difference in marks on a multimodal writing task completed at the beginning of the workshop, this result suggests that in this setting there may have been a benefit for writing ability improvement from using Narrative Threads. As it was not appropriate to set

controlled tests for these groups in the naturalistic setting of a workshop, this result does not offer insight into whether the writing ability improved, but given the short time period involved this would be unlikely. The differences in the groups may have been to do with motivation for the writing task rather than ability, as two participants in the BT toolset group put very little effort into their game covers. On the one hand it seems to suggest that the NT tools may help improve motivation for related writing tasks, although it could also indicate that pupils in the Basic Toolset group were more reluctant to give up time working on their games. However, given that all participants knew that they were taking away a full copy of the game creation software with them, along with their games this seems unlikely to have been a major consideration. One of the aims of Narrative Threads was to encourage users to reflect more fully on narrative elements within their games, so a key factor may have been that this additional reflection was evidenced in the quantity and quality of content on the game boxes,

RQ4. How is this additional interface support used by young designers over the course of a game creation project? Does the additional support change the way the toolset is used, and is there any motivational cost from the tool?

The use of the additional support, Narrative Threads, was examined through a triangulation of different data sources. Findings were synthesised from system logs, researcher observations and interview responses. In both settings that characters creator tool was by far the most well used, and there was a high level of satisfaction with the tool in both settings. In the school setting the tool was used most often for setting basic properties such as appearance, voice, name and gender, although a number of pupils mentioned having used the strength and weakness cards to define their character's properties during the interviews. In the workshop study the use of these cards was more pronounced, with this being mentioned as a key use of the tool almost as frequently as the more basic functions. Characters descriptions were written fairly frequently in the workshop setting, and there were nearly twice as many descriptions as back-stories written, suggesting that showing the in-game outcome of writing descriptions may have successfully encouraged users to write them (as the back-stories had no equivalent in-game representation). In the school setting over twice as many descriptions as back-stories were written, but the overall number of descriptions written was quite low.

In both settings the second most frequently performed activity within Narrative Threads was the adding of important game elements (including characters) to the game world. This was clearly tied to the creator tasks, but also involved area design work which is always an activity which participants are observed to spend considerable time on. The branching narrative diagram tool was the tool which had the next highest usage in terms of time in both the school and the workshop, although in both cases most participants only used the tool once. This was

disappointing as one of the aims of the tool was to promote participants returning to this kind of diagramming task throughout the game creation process.

The other creator tools were all used for relatively small amounts of time, but this was unsurprising given that they were only intended for use when creating objects crucial to the narrative, and there were not many examples of objects which took such a role observed in these games (the games are examined in detail in the following chapter).

Early participatory design studies into the design of the creator tools indicated that it was important for compositional elements to have a noticeable outcome in the game. This was applied at the level of the creator tools, but it was not possible to carry this through to all of the other tools. It is notable that the character creator tool, which most fully achieved the goal of relating tasks to in-game outcomes, was by far the most widely used.

The module statistics provided a way of examining potential differences in toolset usage between the groups using the toolset with and without Narrative Threads. In the school setting the Basic Toolset group created significantly more creatures and placed effects, over the double the amount added by Toolset NT users. The addition of significantly more creatures in the school setting is potentially of interest, as one of the observed behaviours which led to the positing of the usefulness of the character creator tool was a tendency for designers to add multiple versions of readymade characters (as discussed in 2.4.2.2). The addition of significantly more placed effects is harder to interpret. It could be indicative of a greater focus on area design, but as the numbers of trees, doors and buildings are not significantly higher it is unlikely to suggest this.

In the workshop setting, the Toolset NT group wrote significantly more words within conversations, as well as adding significantly more scripted conditions to conversations lines, but the Toolset Basic group created significantly more areas. The significantly higher conversation word count is of particular interest, given that one of the key aims of Narrative Threads was to encourage practice of writing skills. This suggests that Narrative Threads may have had a positive effect on writing levels within the game, particularly when considering the slight trend for the Toolset Basic group to write more on the pre-workshop writing task. The significant difference in number of conditions on conversation lines is intriguing and may suggest that Narrative Threads encourages participants to use more conditionals in their scripting. A significant difference in the number of areas created could indicate that the Toolset Basic group focussed on creating a large number of levels for their games, although there is no way of automatically determining whether all the areas created are connected up and included in the final game.

Without a measure of quality of the games some of these differences are hard to interpret, and the findings should be considered in the light of the results of the in depth analysis presented in the following chapter.

In motivational terms there was a trend for the Basic Toolset group to report slightly higher levels of enjoyment with the project. 63% of Basic Toolset users compared with 57% of the NT toolset users said that they enjoyed the project and would like to do it again. 38% of the Basic Toolset group and 33% of NT users agreed that they enjoyed some parts of the project. None of the group who used the basic toolset said that they did not enjoy the project, whilst 10% of the NT toolset group chose this option. There were some complicating factors with the survey which may have skewed the results, however. The NT class filled out the survey during their regular compulsory class, meaning that all pupils who were not absent from school that day filled it out. However, due to timetabling disruption the Basic Toolset class could not complete the survey during regular class time, and pupils were asked on the last day of term to voluntarily leave their form groups (where they were playing games and watching videos) to complete the survey in an ICT suite. This may have had an influence on the reported enjoyment levels, as pupils who had not enjoyed the project might have been less likely to take the time to fill the survey out.

RQ5. Are there noticeable differences between the games created with the additional interface support and those created without this support? If so, how do these games differ, and is there a difference in the writing skills demonstrated in the games?

The work examined in this chapter made some first steps towards answering this question through the analysis of the results of the automated module analysis tool. In the school setting the results showed that users of the basic version of the toolset added significantly more characters and placed effects (e.g. fires/ lighting effects) to their game. Taken alone it is hard to interpret the significance of this finding, as there is no measure of the quality or importance of the characters/effects added, nor whether these elements are carefully designed individuals or multiple copies of the same element. The following chapter will examine the quality of the games created in much greater depth, and will allow further investigation of this question.

RQ7. How can the broader activity context support game creation? How does it affect the usage of the additional support, the skills demonstrated in the games created, and any improvement in writing ability?

The workshop groups were inevitably much more highly motivated as a whole than the school classes, as they had chosen to give up their school holidays to take part in a game creation project. There were also a number of elements of the settings which made a big difference to

how these participants used the tools. Instead of three 50 minute sessions every two weeks the workshop participants had more intense period of time working on their game

There were many more instances of young people forgetting what they had learnt previously in the school setting: with gaps of more than 7 days between many of the 50 minute sessions, there was a problem with the quality and arrangement of the time spent, as well as a low total overall time. Investigation of the effect this had on the quality of games created will be carried out in the following chapter.

There were clear differences between the school classes, which may have affected the results from the study. Whilst the mean writing and reading levels of the classes were similar prior to the study, there was a much higher variation in the Toolset Basic class, and there were a number of high achieving pupils as well as some pupils with very low literacy levels. In contrast the NT Toolset class had many more pupils rated at a similar, middling level.

5.5 Chapter Summary

This chapter has focussed on the process of game creation and the benefits to performance on related writing tasks and more general writing ability. However, to explore the research questions which focus on the games produced, a more in-depth analysis was carried out on the games themselves: this is presented in the following chapter.

6 Analysis of Games

6.1 Introduction

This chapter focusses on the games created during the studies described in the previous chapter. It presents in-depth analyses of these games to examine the writing skills demonstrated through them (RQ1), explore potential differences in games created with and without additional support (RQ5) and address the influence of context on the games created (RQ7).

First, a high level mode of analysis was used to examine all 67 games created across the two settings. This involved assessment of each game against a rating scheme, as described in the following sub-section. This scheme-based analysis, presented in 6.2, was designed to examine the differences between games created with and without additional support, and in different settings. Subsequently, a more in-depth and qualitative mode of analysis was chosen to examine the multimodal writing skills demonstrated through the games, as presented in 6.3.

6.2 Game Rating Scheme

In this section, the scheme-based analysis of all games created is presented. A new scheme for the rating of narrative-based games is introduced and explained below. Following this, the game rating exercise which uses the scheme is described, and the results are presented.

6.2.1 Scheme overview

To allow exploration of the differences between games created with and without Narrative Threads, I created a new scheme for expert evaluation of narrative-based games. The scheme was created with reference to work on peer-based evaluation carried out as part of the Adventure Author project and developed based on observations drawn from the design studies outlined in Chapter 4. The scheme is designed to be used by educators and researchers with knowledge of the game creation process, as it assumes some familiarity with basic game creation terms and concepts. It is targeted specifically at narrative-based games created by young people aged 11-15.

The requirements for the scheme were that it should allow an educator or researcher with experience of game creation projects to assess games efficiently and produce numerical scores across a range of categories which reflect the quality of the game. The first step was deciding on the key categories for inclusion in the scheme. This was carried out with reference to categories used within the Adventure Author software. A default worksheet for use with their Comments Cards software was created by the AA literacy specialist and included twenty-four questions

designed to support peer evaluation of games¹. These questions were chosen as helpful aspects for young designers to focus on when giving formative feedback on their peers' narrative-based 3D games. These provided a good starting point for the scheme as they covered a number of important aspects of narrative-based games created by young people using the NWN2 toolset. However, they were not intended for use as an assessment schema, and were aimed at young people rather than teachers. To form the basis of the new scheme the existing questions were examined and condensed into nine overall categories of approximately equal importance to game quality: *Storyline*, *Visual Interest of Areas*, *Player Guidance*, *Player Purpose/ Goals*, *Player Choice*, *Characters*, *Dialogues*, *Imagination and Challenge*. The nine categories each deal with different aspects of the game, but in some cases there is a small amount of dependency and crossover between categories. For example, *Storyline* and *Dialogue* are separate categories, but in order to receive the highest mark for *Dialogue*, some game conversations would need to be well-integrated into the storyline of the game.

The next step was providing support for the assigning of numerical scores for each category. A scale of 0-10 was chosen for scoring, and descriptors were written to reflect what a game should be like to receive full, half or no marks on each of the categories. These descriptors were generated based on my experiences of witnessing the creation of one-hundred and twelve games during the design studies. The key characteristics observed in this set of games, and the range of quality levels observed during creation were used to inform the descriptors. The descriptors were designed to help the rater judge what a game should be like in order to warrant certain scores on each category with a view to promoting a reliable and repeatable approach to scoring. A single mark representing the overall quality of the game can be calculated by summing the individual numerical ratings for each category, giving a mark out of ninety.

Additionally, common game features observed during the design studies were used to create a series of tick boxes to record the presence or absence of noteworthy elements. These allow further analysis of the features which are embodied in games of varying levels of quality, and encourage the rater to consider all relevant factors when assigning the numerical score. However, these elements are not necessarily positive or negative, so no meaning can be interpreted from the number of ticks given (for example, 'utilitarian conversations', one of the tick boxes in the *Dialogues* category, only seem to exist to make a scripted event happen). In two categories the rater is asked to give short descriptions of examples of game elements of the corresponding category, instead of using tick boxes.

¹ available at http://judyrobertson.typepad.com/adventure_author/comment-cards.html, last accessed 21/06/2011

The scheme was sent to the AA literacy expert for feedback, and some wording changes were made as a result, as well as the addition of a further tick box in two of the categories. The categories and descriptors are summarised in the following sub-sections, and the final scheme marking form is shown in Appendix C.1.

6.2.1.1 *Storyline*

The rater is asked to give a score out of ten which reflects the extent to which the game has a clear storyline. The level descriptors specify that for a game to receive full marks on this category there should be a clear storyline running throughout the game which is supported by the visual design of the areas, characters, conversations, buildings and objects. To receive half marks there should be some story ideas communicated to the player through some elements of the game. For a game to warrant receiving zero marks on this category there would be no evidence of any story ideas in area design, character or object choices.

The tick boxes in this category record whether or not storyline is conveyed through the following elements: terrain/ texturing or tileset of area(s); objects placed in area(s) (e.g. trees, buildings, furniture); character appearances; character behaviours; character names; area or object names; character conversations; text on objects (i.e. signposts); descriptions of objects. The rater can also tick 'other' and record the presence of additional elements used to convey storyline.

6.2.1.2 *Visual Interest of Areas*

The rater is asked to give a score out of ten which reflects the extent to which the game areas are visually interesting. The level descriptors specify that for a game to receive full marks on this category the game areas should be very visually interesting and should successfully convey a convincing sense of the environment in which the game is set. To receive half marks, areas should have some interesting elements. There should be some sign of a coherent idea about the locations in the game, but there may be elements which are incongruous or seem to have been placed without thought. For a game to receive zero marks on this category the game areas would be very sparse and very little attention would have been paid to landscaping or decorating.

The tick boxes in this category record whether or not the designer has made use of the following in their area design: raising or lowering ground to create a landscaped terrain; different textures to create pathways and other features on the ground; trees and vegetation; buildings and other manmade structures; creatures which appear to have been added as scenery or 'extras'; water; special effects (e.g. fire or light bolts); identifiable locations which help to emphasise an episode in the game (e.g. a dragon's lair). The rater can also tick 'other' and record the presence of additional elements related to the visual interest of areas.

6.2.1.3 *Player Guidance*

The rater is asked to give a score out of ten which reflects how well the designer guides the player about where to go. The level descriptors specify that for a game to receive full marks on this category the player should be guided in subtle but clear ways which are seamlessly integrated into conversations or area design elements (such as paths or gaps in mountain ranges etc.) To receive half marks the player must be given some clues as to which way they should go, but these might be hard to understand or the clues themselves might be hard to find. For a game to receive no marks on this category the player would have been given no idea about where the interesting elements of the game are or how to find them.

The tick boxes in this category record whether or not the designer has made use of the following to guide the player around the area: subtle hints in conversations; explicit directions in conversations; pathways; signposts; text in objects (e.g. a book); landscaping elements such as a clearing in trees or a valley. The rater also has the opportunity to tick ‘other’ and record the presence of additional elements used to guide the player.

6.2.1.4 *Player Purpose/ Goals*

The rater is asked to give a score out of ten which reflects the extent to which the player has a clear purpose or goals in the game. The level descriptors specify that for a game to receive full marks on this category the player should be given clear information about and motivation for their goals. To receive half marks the player should be given some clues as to what their objective might be, either through conversations, behaviours or area design, but other elements might be left unexplained (for example, the reasons why certain characters are their enemies and must be defeated.) For a game to receive no marks on this category the player would have no idea about where they are, why they are there, who is on their side or what they should do.

The tick boxes in this category record whether or not the designer has made use of the following to give the player information about their goals or objectives: subtle hints in conversations; explicit explanations in conversations; character behaviours; text in objects (e.g. a book). The rater can also tick ‘other’ and record the presence of additional elements used to give the player information about their purpose in the game.

6.2.1.5 *Player Choice*

The rater is asked to give a score out of ten which reflects the extent to which the player is able to make meaningful choices in the game. The level descriptors specify that for a game to receive full marks on this category the player should be able to make choices which make a difference to how the game narrative proceeds. The player should also have a real sense of agency about elements such as which quests to tackle and which characters to befriend and which to make enemies. To receive half marks the player should be given some choices in elements such as which way to proceed, which areas to explore or how to respond to characters, but these choices

might not have a noticeable effect on how the plot proceeds. For a game to receive zero marks on this category the player would have no choice at all in how to proceed through the game.

The tick boxes in this category record whether or not the player has the opportunity to make choices of the following kinds: taking different routes through an area; choices of what to say in a conversation; choices of what to say in a conversation with noticeable consequences. The rater also has the opportunity to tick 'other' and record the presence of other ways in which the player can exercise choice within the game.

6.2.1.6 Characters

The rater is asked to give a score out of ten which reflects the extent to which there are interesting characters for the player to meet. The level descriptors specify that for a game to receive full marks on this category a number of the characters in the game should have interesting personalities or intriguing motivations, and be well integrated into the storyline. To receive half marks at least one of the characters in the game should have an interesting personality or goal which the player finds out about through conversations, appearances or behaviour. For a game to receive no marks on this category none of the game characters would have anything interesting about them in the way they look, act or what they say.

For the second section of this category the rater is asked to pick two game characters and explain why they are interesting or uninteresting.

6.2.1.7 Dialogues

The rater is asked to give a score out of ten which reflects the extent to which there are interesting dialogues for the player to engage in. The level descriptors specify that for a game to receive full marks on this category a number of the characters in the game should have conversations which the player can engage in and which help advance the main storyline or sub plots in some way. To receive half marks at least one of the characters in the game should have a conversation with some element of interest. For a game to receive zero marks on this category there would be no characters the player can speak to in the game.

The tick boxes in this category record whether or not some conversations in the game include the following elements: humour; convincing dialect/language chosen to illustrate character's background; good descriptive language; plot-advancing information; 'utilitarian' conversation (only existing to serve the purpose of making something happen through an attached script). The rater also has the opportunity to record the presence of other notable conversation characteristics.

6.2.1.8 *Imagination*

The rater is asked to give a score out of ten which reflects the extent to which the game shows imagination. The level descriptors specify that for a game to receive full marks on this category the game should have an imaginative storyline and inventive elements which are well-integrated and support the narrative. To receive half marks the rater should judge that the designer has had some interesting ideas and tried to incorporate elements which are novel, interesting or humorous in the characters, objects, areas or storyline. For a game to receive no marks in this category no aspects of the game would be judged to show imagination or creativity and elements would appear to have been included at random.

For the second section of this category the rater is asked to give an example of an imaginative element in the game, if there are any.

6.2.1.9 *Challenge*

The rater is asked to give a score out of ten which reflects the extent to which the challenge level of the game is appropriate. The level descriptors specify that for a game to receive full marks on this category the whole game should be well-balanced with quests or missions which are pitched at the right level of challenge so that they are interesting but not impossible. To receive half marks the rater should judge that the designer has got the challenge level right in some places within the game. For a game to receive no marks on this category the game would be much too hard or much too easy (either the player keeps dying, or else there are no challenges or threats).

The tick boxes in this category record whether or not the game includes the following challenge related elements: a challenge or quest to be completed; a battle which is too hard for the player (involves dying multiple times); a battle which is of appropriate difficulty for the player (can be won after a short to medium length fight). The rater also has the opportunity to record the presence of other challenge related elements which are present in the game.

6.2.2 School game ratings

The games created by the pupils were analysed using the rating scheme described in the previous sub-section. The author conducted the rating of the 53 games and had 12 (22%) of the games re-coded by an independent expert who was blind to the conditions under which the games were created. The independent expert was a teacher with experience of game creation with the NWN2 toolset but no involvement in the workshop study. The author had been present in the classroom whilst the games were being created, but given the large number of participants and the time delay before analysis (2 months), awareness of the conditions was minimal.

The first step taken was to examine the inter-rater reliability between the author's ratings and those of the independent expert on 12 game subset of the data. Correlations between the two

sets of ratings were calculated using the Pearson product-moment correlation coefficient (Pearson's r). As the rating data comes from an 11 point rating scale rather than being categorical, an inter-rater reliability test was used instead of an inter-rater agreement measure. The results (in Appendix C.2) show a very strong significant positive correlation for the total overall score given by the two raters, as well as for the storyline, purpose, choices, interesting characters, interesting dialogues and imagination ratings (all $r > 0.73$, $n=12$, $p < 0.01$). For the ratings related to guidance there was a moderately strong significant positive correlation between the two sets of scores ($r = 0.68$, $n=12$, $p < 0.05$). On the categories of visual interest and challenge there was a positive correlation, but this was not significant. The level of correlation between the ratings was deemed to satisfactorily justify the use of the author's full set of ratings, but the visual interest and challenge ratings cannot be considered to be fully reliable.

The distribution of ratings across the two group are shown below in box plot form². Figure 6.1 shows the overall ratings and Figure 6.2 shows the ten sub-category ratings. The first thing to note is the very low scores overall. Even the most highly rated game received an overall mark below 50%. In comparing the two groups, the overall picture indicates that there was a trend for pupils in the Basic Toolset class to receive slightly higher ratings.

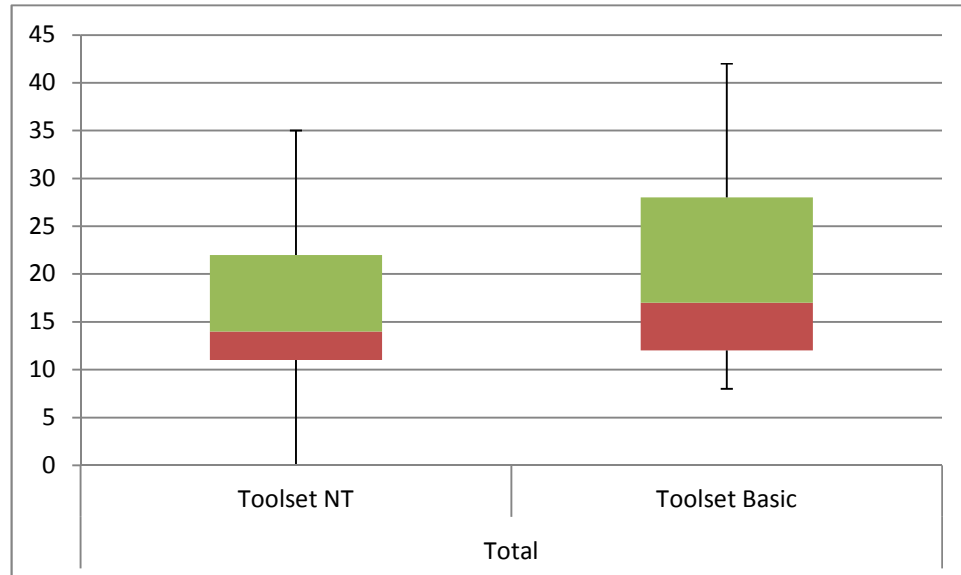


Figure 6.1: Total game ratings across groups – School Study

² Box plots in this thesis show the minimum and maximum data points through the whiskers, with the top and bottom of the boxes indicating the 75th and 25th percentile and the central line indicating the median.

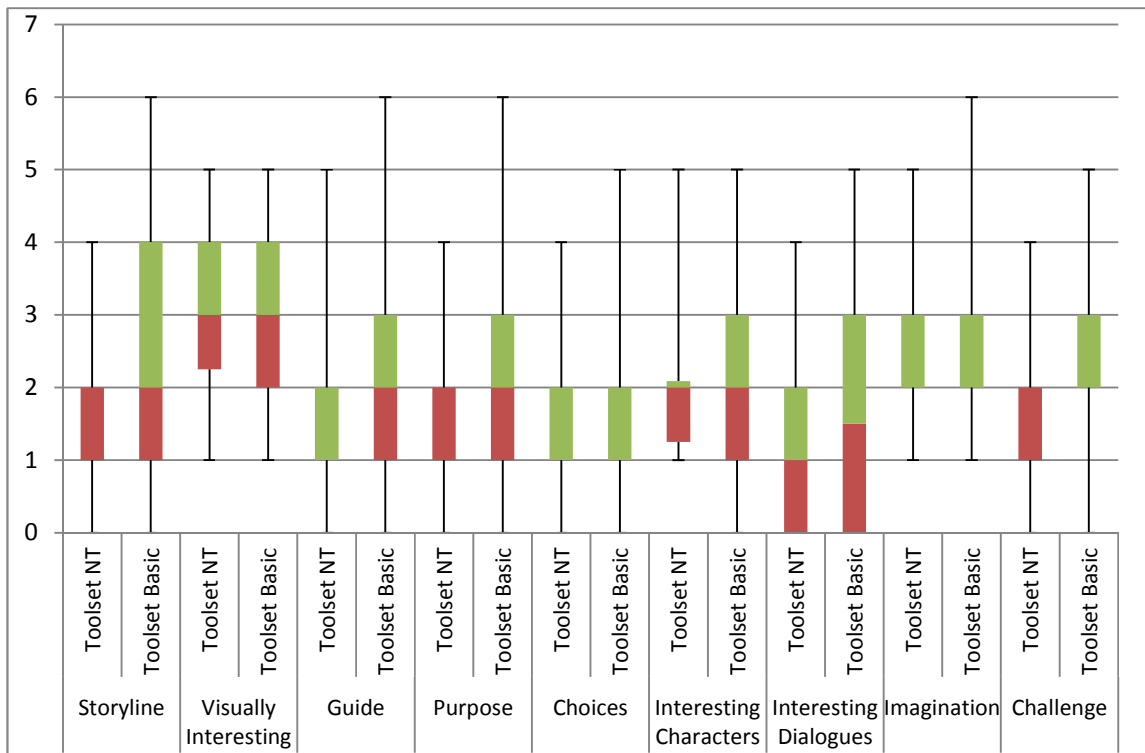


Figure 6.2: Individual Category Game Ratings across Groups – School Study

Although the data was interval data, most of the categories were not normally distributed and a number of them were not shown to have equality of variances. For this reason, independent samples Mann-Whitney U tests were run to examine the differences between the two classes' game ratings (full results shown in Appendix C.3). The results showed that, despite a trend for the Toolset Basic group to receive higher game ratings, the difference was not significant. The only category on which there was a significant difference is challenge ($U = 457.5$, $Z = 1.99$, $n = 53$, $p < 0.05$), but given that the challenge ratings from Rater 1 did not significantly correlate with those of Rater 2 this finding is very uncertain.

6.2.3 Workshop game ratings

As the numbers were smaller in this study it was possible to appoint an independent rater to mark all the games. The 14 workshop games were rated against the scheme by a teacher with experience of game creation with the NWN2 toolset, and no involvement in the study or awareness of conditions. To check the reliability of ratings, the games were also rated by the author and the inter-rater reliability calculated in the form of the Pearson correlation. As with the school data, inter-rater reliability was examined rather than inter-rater agreement due to the ranking scores being non-continuous interval data. The correlation results (see Appendix C.4) show a highly significant positive correlation for the total overall score given by the two raters, as well as for the storyline and purpose ratings (all $r > 0.72$, $n = 14$, $p < 0.01$). For the ratings related to characters, dialogues, imagination, visually interesting, guiding, meaningful choice and challenge there was a moderately strong significant positive correlation between the two sets of scores ($r > 0.60$, $n = 14$, $p < 0.05$). These correlations were deemed to be satisfactory.

The games of both workshop groups were rated considerably higher than those of the school groups, with the full range of the scale coming into play here. Figure 6.3 shows the overall game ratings from the teacher for each group, and Figure 6.4 shows the sub-category ratings. Within the workshop games there is a visible trend for the games created by the Toolset NT group to be rated more highly.

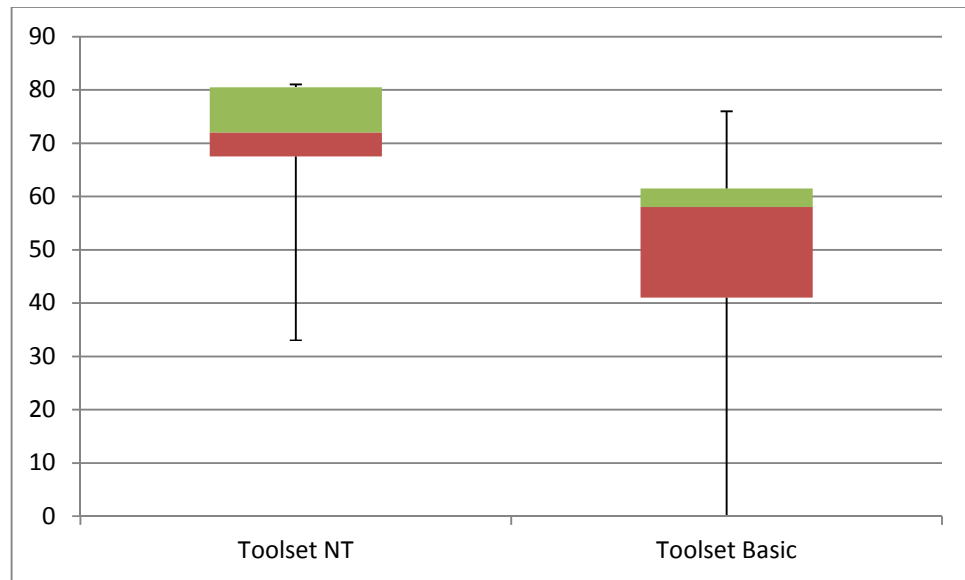


Figure 6.3: Total Game Ratings for Groups – Workshop Study

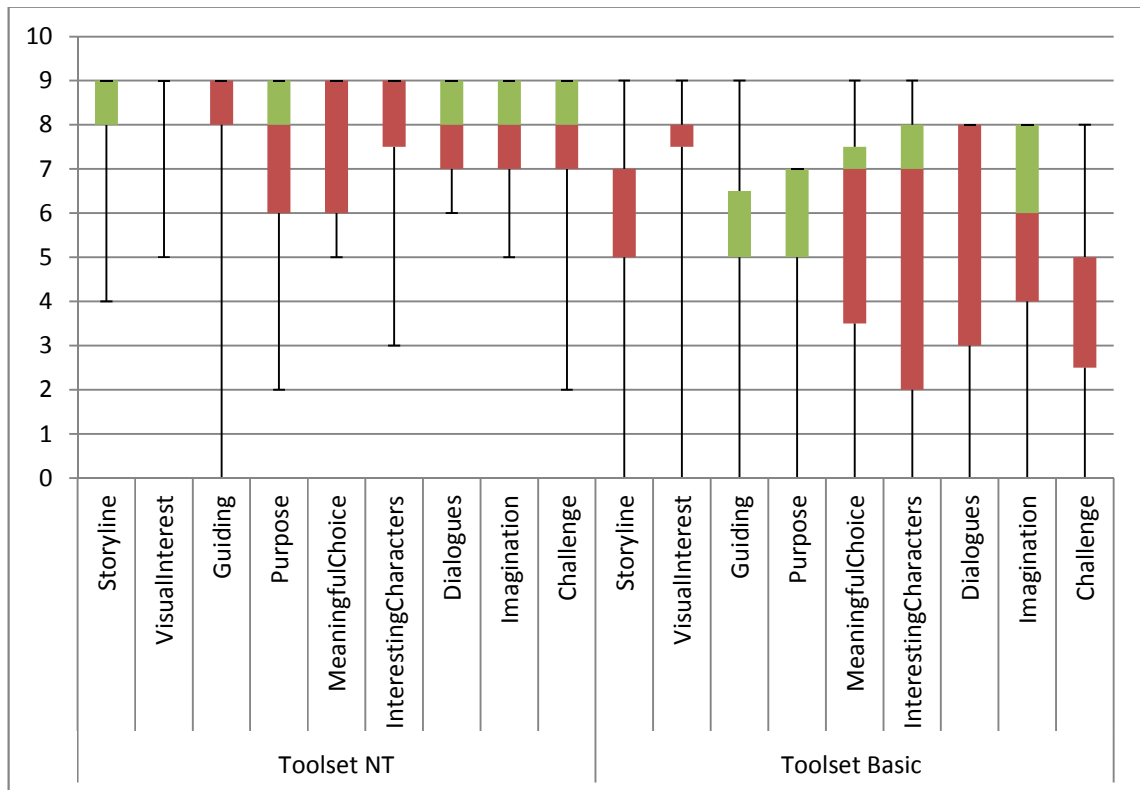


Figure 6.4: Sub-category Ratings for Groups – Workshop Study

Although the data was interval data, many of the categories violated the assumptions of normality and equality of variance. For this reason, Independent Samples Mann Whitney U Tests were carried out on the data, and the full results are shown in Appendix C.5. The tests indicated that there is a significant difference between the two groups on the total rating for each game ($U=8$, $Z= -2.11$, $n=14$, $p<0.05$), with the games created using Narrative Threads rated more highly. There are also significant differences on the sub-categories of Visually Interesting ($U=9$, $Z=-2.14$, $n=14$, $p< 0.05$) and Challenge ($U=7.5$, $Z=-2.21$, $n=14$, $p=0.05$), with games created using Narrative Threads again rated more highly.

6.3 Multimodal Analysis

In order to address the question of the multimodal writing skills practised during game creation (RQ1) and further explore potential differences between the two groups (RQ5), a subset of games was selected for an in-depth multimodal analysis.

6.3.1 Approach

Multimodal analysis is a methodological approach to transcribing and analysing data which involves multiple representational modes. There are a number of different approaches to multimodal analysis, as described in (Jewitt 2009). Systemic functional multimodal discourse analysis focuses on the grammatical organisational principles of multimodality and closely examines the hierarchical structure of multimodal artefacts (O'Toole 2004; O'Halloran 2008). Multimodal interactional analysis takes a multimodal approach to examining people's actions, and places emphasis on people as social actors, taking into account context and situated interaction (Norris 2004; Norris and Jones 2005). Finally, social semiotic multimodal analysis focusses on the sign-maker's use of modal resources, emphasising the choices they make between representational modes and the way that context shapes the resources available and their usage (Jewitt 2009; Kress 2009). As this study focuses on the skills of the young game designers as evidenced in their games the social semiotic approach was the most appropriate choice for this work.

The overall scores awarded against the game rating schema were used to select games from across the range of quality. The lowest rated games in each group were removed as these were so sparse that it was not profitable to analyse them. As a result, the single lowest rated games in each group at the workshop and the two lowest rated games from each school group were eliminated. Three of the remaining games were then selected from each of the two workshop groups; in each group the games rated 1st, 3rd and 6th were picked. With the school groups the selection was more complicated as the groups were of different sizes. The highest and lowest rated of the remaining games in each group were selected, along with the game ranked closest to

the median rank. Where there were games jointly awarded the same target rank one was selected at random from the possible candidate games.

In line with the approaches described in (Flewitt, Hampel, Hauck et al. 2009) multimodal transcriptions in grid form were made of each selected game. A key choice in the transcription process was the base unit of analysis. Where the artefact under analysis is video, researchers often select a temporal or frame-based measurement to define a unit of analysis (e.g. Baldry and Thibault 2006; Hampel and Hauck 2006; both referenced in Flewitt et al. 2009).

These options are not appropriate in a game scenario, so a core analytic unit of an in-game encounter was chosen. Each unit was associated with a player interaction with a given character or object, and the scope covered the full a narrative event sequence. The scope of a full event sequence was selected in order to preserve the meaning of the encounters. Separating out smaller chunks would have taken away the fundamental significance of many of the events, as they rely on the actions before and after them to make sense in narrative terms. Each encounter is logged with a screenshot of the associated character or object, a textual description of the encounter, and a record of key characteristics of the encounter. These characteristics include an ID number, an encounter type, any conditions which must be satisfied for the encounter to take place, the approximate location, and finally the representational modes used to convey information about the encounter. At a higher level the encounters are grouped under game areas, and each game area is also described in terms of navigation and setting, recorded along with a screen shot of the area layout (to which the location field of the encounter records makes reference).

I produced the transcriptions by completing multiple play-throughs of each game, taking account of each area and all potential sequences which could play out within the game. To address the interactivity and choice elements all potential actions were considered, but the conditions required for events to take place were noted, as described above. The transcriptions were used to build a catalogue of in-game meaning-making, focusing on the information communicated as well as the mode(s) used in the communication.

The transcriptions were analysed for their embodiment of basic narrative elements, and the mode(s) chosen to convey these narrative elements. The analysis aimed to examine meaning-making in games in the form of interactive narrative, investigating how different modes were used to communicate and how modes were created and chosen by the young people to communicate their meanings. Although there is much more to games in general than communicating meaning, this element is of greatest interest in relation to RQ1 which examines the writing skills demonstrated in the narrative-based games created by young people.

The transcribed content was examined with reference to a set of key narrative elements. The categories of *backstory*, *setting*, *characters* and *plot* were drawn from literature on narrative theory and game-based narratives examined in Chapter 2, and the additional category of *guidance* emerged as having great narrative importance as the analysis progressed. Finally, the category of *themes* was used to consider the higher level ideas conveyed through the narratives.

A summary of each category was produced, and examples were sought from each game to demonstrate the level of success in conveying different narrative elements, as well as the representational modes used. The key data used to produce the summaries was the game, as represented in the multimodal transcriptions, with interview and survey data used where available as supporting evidence to enrich my understanding of the designers' purpose.

6.3.2 Modes used

Within the overall medium of a 3D computer game, a number of modes are used to represent the narrative and communicate with the player. The key modes observed in this analysis were categorised as follows:

1. Text – text appears on the screen in a number of ways, including in conversation lines, pop-up message boxes, and character and object names.
2. Visual – the appearance of the game worlds and the objects and characters which inhabit them.
3. Actions – the movement of the characters and objects within the game.
4. Sound – the audio accompanying the game. No distinction is made between speech and sound effects as no participants recorded speech for their games in this study.

The large majority of designers used the first three modes most heavily. In the school setup pupils were required to use headphones to test audio aspects of the game, which led to sound not being a central focus for many pupils. In the workshop setting more participants made use of audio, but this tended to be in background roles, for example birdsong contributing to setting and atmosphere. In general, text acted as a central mode for representing meaning for most participants, but the visual and action modes were also used to convey meaning to good effect by many participants.

6.3.3 Game summaries

A short summary of each game analysed is given below, along with a representative screenshot. These are intended to give an overview of the games created and provide context for the discussion of narrative elements within the games. The designer's intended traversal of the game is represented here (as far as it was possible to interpret this from the play-throughs and survey/interview data) although other meaningful paths are also highlighted. The rankings given to each game by the expert rater using the assessment schema are listed for information. All names are pseudonyms, and a code has been included after each name which is used within the

main analysis to make it easy for the reader to keep track of the conditions under which the games were created. The code first shows the study context (School=S, Workshop=W), and then the toolset version (Basic Toolset=B-T, Narrative Threads Toolset=NT-T).

6.3.3.1 **School games**

Katerina (S B-T)– ranked 1st in Basic Toolset group, ranked 1st across both groups

Katerina developed an interesting, and fairly coherent story. The player is asked to help some pixies expel the trolls that have overrun their village. We are told about a fabled weapon – an ice arrow which can kill any living creature. The pixies warn that many have died looking for it, but they ask the player to try to find it. The player is then encouraged to find some wolves, who can apparently give more information about its



Figure 6.5: Scene from Katerina's Game

whereabouts, but also warned that some of the wolves can be nasty. When the player finds the wolves she can talk to two of them; one will tell her where the arrow is, whilst the other will laugh and immediately attack. If the player asks the right wolf she will find out that the arrow is guarded by a dragon behind the mountains. The dragon turns out to be too powerful to beat, but the player is still able to pick up the ice arrow from behind him with little difficulty.

The designer has worked hard on giving the player clear directions – mostly she has relied on landmarks such as woods and mountains which are mentioned in conversations, and can then be located by the player in the distance. This is a fairly standard rescue quest storyline, and the characters are not particularly deeply developed, but there is a nice coherence to the narrative and good player awareness.

Owen (S B-T)– ranked joint 15th in Basic Toolset group, ranked 28th across both groups

Owen clearly put some work into the background to his game, but no real story comes through to the player. His careful naming of areas as 'high street' and 'my house' make it clear that some thought has been given to the areas, however, there is not much other communication of a story or context to the player. A talking



Figure 6.6: Scene from Owen's Game

chicken has the only conversation in the game. Through this conversation we find out that the player is looking for two dragons, and the chicken warns the player against killing them. There is also a large battle going on between a group of hostile and commoner creatures, which the player can become involved in if they get near to it. This is not explained or referred to by any of the characters.

The design of the area which seems to be intended as the player's house, is very sparse; there are a few items such as a target board, but no further indication of the player's life or motivations. There is some attempt at guiding the player through proximity, as the door to the player's house and the talking chicken are placed close to where the player starts. The black dragons are mentioned in the conversation with the chicken, which may lead the player to seek them out by looking for them in the distance.

Jay (S B-T) – ranked 26th in Basic Toolset group, ranked joint 47th across both groups

This is a game which centres on battle sequences. The player arrives in the starting area in the middle of a huge battle between different factions of characters. The player can join in if they choose, or explore other parts of the area. They player can talk to two of the commoner character dragons (when they are not in battle), but these very short conversations do not offer any insight into why the battle is taking place. There is an internal area accessible through a door, but inside the house there are many more hostile creatures who will attack the player on site. We get no sense of why the player is there, or who the other characters are.



Figure 6.7: Scene from Jay's Game

Susan (S NT-T) – ranked 1st in NT Toolset group, ranked 5th across both groups



Figure 6.8: Scene from Susan's Game

Susan clearly had some interesting story ideas, and was successful to some extent in conveying them. In the game we find out that the player is on some kind of mission for their master, but along the way she is also asked to help out the local people in the village in which she finds herself. If the player chooses to help we learn that a witch is coming to kill the villagers. The

player can find and speak to the witch within the area, and may receive threats from her depending on the options chosen.

The designer has put some thought into the story, and has paid particular attention to characterisation, with two of the three main characters having clear personas expressed through their appearance and the language used in conversations. The guidance here is quite poor. Initial indication is given by placing a character with a conversation in front of where the player starts, but after this there are no further clues about where to go or who to talk to. It would be easy for the player to speak to the witch before the person who warns them about the witch, meaning that the conversation with the witch wouldn't make sense. Unfortunately no interview or survey data is available for Susan, as she was absent at the end of term.

Jane (S NT-T) – ranked joint 13th in NT Toolset group, ranked 32nd across both groups



Figure 6.9: Scene from Jane's Game

Jane clearly put some effort into area design and character creation, but it seems as though not much thought has gone into the story. There is one conversation, but it does not reveal much, apart from the fact that the player is looking for help because there are lots of hostile creatures in the area. There appears to be a battle between two different sides taking place in the area, but we are not

given any indication of the background to this. There is a second area which can be reached through a door, but there is nothing of interest in the new area.

Jane struggled with giving the player adequate guidance. The player starts facing away from the one creature that has a conversation, and away from the house which they can enter. This makes it hard for them to find the things of interest in the area. There has been very little thought put into guiding the player.

Zane (S NT-T) – ranked 23rd in NT Toolset group, ranked joint 49th across both groups



Figure 6.10: Scene from Zane's Game

Zane created a game with only one character, who is hostile to the player, and no conversations. There are also no other indications of purpose, goal or background to the game. Despite this, the starting area seems to have been designed

quite thoughtfully, and gives the impression of a town with a number of sinister features, such as blood red lakes and a burnt out building which the hostile character stands next to. There is a second area, accessed through the door to a building, but this is completely empty inside. The player is guided to some extent by proximity; the door to the new area is close by the start point, and in the direction that the player will start facing.

6.3.3.2 **Workshop games**

Richard (W B-T) – ranked 1st in Basic Toolset group, ranked 4th across both groups

Richard created a game with many areas, but without as clear a storyline as some of the other workshop games. Interestingly, in the end of week interview, when prompted to describe the story of his game Richard explained that the player's town has been burnt down and destroyed by a creature, and the player has to find the creature, and also his family, who have gone missing. However, no elements of this story are evident in the game. There is a town section which seems quite empty, but there is no evidence of it having been burnt down, and the one person in the town who the player can speak to makes no mention of there having been a disaster in the town. Neither is any mention made of his family by any character.



Figure 6.11: Scene from Richard's Game

The player is not given a clear purpose in the game, but the implied purpose is that of collecting treasure. Wooden signs near the start point encourage the player in a certain direction, who then battles through some hostile creatures to get to a house where treasure is being guarded by some zombies. Along the way a dragon and a spider give some useful information, such as the locations of the hostile creatures and treasure, but the characterisation is quite weak, as we don't get any

sense of what their relationship is to the player, why they are helping, or what they think of him. Finally the player reaches a sparse village with two buildings. One building is empty, and in the other we meet a blacksmith who tells the player to go and find his twin, the other blacksmith. It is possible that the story Richard described in his interview was supposed to unfold after this point, but this was as far as he got.

Richard appears to have focused on setting challenges for the player, such as fighting the zombies to gather the treasure, rather than connecting up the encounters into a coherent story. The player is guided reasonably well through paths and signs, although the hilly terrain made

the path hard to keep track of in places, and no explicit information is given about where the player should be heading or what they should be doing.

Alan (W B-T) – ranked 3rd in Basic Toolset group, ranked 9th across both groups

Alan had difficulty getting his story ideas across in his game, and also in setting a reasonable challenge level for players. Although he explained in his interview that the game is about rescuing the player's brother, there is no mention of this in the game, either in dialogue or by any other means.

There is in fact only one conversation in the game, it comes right at the start when the player speaks to a woman

standing nearby. In this conversation the player can ask for help getting to “the boat on the other side”, which results in the woman, and some of the other character standing nearby, joining with the player to fight alongside him. There is no attempt at characterisation of the player or the other characters.



Figure 6.12: Scene from Alan's Game

It is hard to know where to go in this game, as the starting area is very large and there aren't pathways, signposts, or directions from characters. The boat mentioned in the conversation is not visible from the starting point, but becomes so when the player gets nearer. It is also very hard to travel through the area, because there are a large number of hostile creatures, including bears and spiders. There are also lots of items which can be picked up, mainly weapons and armour. If the player makes it to the boat, there is no sign of what to do – no-one to talk to or interact with. However, there is a house a short distance away which the player can enter. This is an internal area with some items which suggest it is a domestic space (two beds, a gong), but also some slightly incongruous items (an alchemical bench, a pile of gold).

There are no characters in this area, but there are some items which can be picked up, mainly staffs to be used as weapons. This appears to be as far as the designer got with the game. The game play in this game is quite poor, due to the exceptionally high number of hostile creatures. Player guidance is also weak, as the player is given little idea of where to go and what to do.

Kofi (BT) – ranked 6th in Basic Toolset group, ranked 13th across both groups

Kofi's was by far the most full and lengthy description anyone gave about their game's storyline during the interviews, but he struggled to implement his ideas within the game in a way the player can understand. The expert independent rater had such trouble navigating the area that she believed that there were no conversations, and as a result



Figure 6.13: Scene from Kofi's Game

understood nothing about the story. This led to a lower rating than might have been appropriate. The player's goal is to help to save the land of Am, which has been thrown into chaos since 'The Entity' came and turned all creatures evil except those who had 'the Orbs'; mystical objects which were then subsequently stolen. The player can get this information from a man called Mou, if they manage to find his house (which the aforementioned rater wasn't able to do). The player's goal is to find the orbs and return them to bring peace back to the land. The story line is very imaginative, if the player is able to find out about it.

The quest involves fighting large numbers of the creatures which have been turned evil, to reach a boat which will take the player to another continent where one of the orbs is to be found. A large number of creatures protect the orb in this new area, but it is possible to reach it. The orb is supposed to teleport the player back to the original area once retrieved, but this appears to be as far as the designer got.

Lack of clear player guidance lets down the imaginative story line to some extent, making it easy to miss the whole purpose of the game. Game play is very hard, as the two battles within the game are impossible to win, although it is possible to run away from them.

James (NT-T) – ranked joint 1st in NT group, ranked joint 1st across both groups

James created a game which tells the story of a young person on the cusp of adulthood being faced with the realities of the world and the necessity of getting a job. A humorous exchange with his father leads to him leaving the family farm to head for the local 'mage station' where his father has secured him his dream job. Along the way the player meets a dodgy merchant keen to relieve him of his money, comes across dangerous creatures, and after fighting off a group of vicious beetles, is 'spotted' by a talent scout from the aforementioned mage station. In

his interview James explained that the player was then due to come up against spies from a rival group who would attack him, but he did not manage to implement this within the time scale.

James's game had a lot of humour in it, and also some touching moments. The player character is developed in a very interesting way.

The game play was well designed in this game, with battles of increasing difficulty placed along the way, in line with the unfolding story. James guides the player well through his game, using area design elements such as pathways in conjunction with dialogue content and pop-up text boxes.



Figure 6.14: Scene from James (NT-T)'s Game

Karen (NT-T) – ranked 3rd in NT group, ranked 3rd across both groups

Karen had some experience using the game making tool, as she had been in one of the classes who were taught to use the NWN2 toolset as part of the design activities. However, she was not one of the pupils involved in the design work, so didn't have any pre-existing familiarity with any of the NT tools.



Figure 6.15: Scene from Karen's Game

Karen said in her end of week interview that she had based the game on a story she was currently writing. She explained that the player takes the role of a young female adventurer, Nicola, and that there is a "noble kid" who wants to become an adventurer, who the player ends up taking on as an apprentice. From there, she explained, the story continues with the pair taking part in adventures to find valuables for a woman called Gloria. The adventurer also meets up with her sister, who eventually betrays her, leading to an on-going

battle between the two. With her game, however, Karen only got up to the point in the story just before the player is due to meet Gloria.

The attention to detail in the game is impressive. Karen put a lot of effort into introducing the character of the noble, explaining the player's persona and conveying the story setting. Karen paid little attention to game play. In the interview she reported plans for quests and battles

within the game, but she did not have time to complete these. Player guidance was taken care of successfully through a combination of textual instructions and area design.

Chris (NT-T) – ranked 6th in NT Toolset group, ranked 7th across both groups

Chris created a game in which the player must travel down to hell to defeat the evil overlord of the land. This story does come out at points within the game, as well as in the end of week interview, but the narrative and goals are not conveyed to the player quite as coherently as with some of the other games. Along the way the player meets a number of other



Figure 6.16: Scene from Chris's Game

characters and attempts to persuade them to join him in his quest to defeat the overlord. They all agree to help in principle, but we see little action from these commitments within the game. Chris did not manage to implement the final showdown with the overlord within the time scale of the workshop.

There was some effort put into characterisation, but we don't get a strong sense of the player's personality, beyond what we learn from the number of short and snappy conversations in which we find him determined to defeat the overlord and responding in a fairly belligerent way to most characters. The game has humorous moments, such as when the player realises that the 'potion to cure hangovers' will be useful for the drunk man in the inn whose help he needs in his quest.

The area design is reasonably effective, with the hell scenes taking place in near darkness, and including burning buildings and a lake of fire. Player guidance is mostly well done, but it is very hard to know where to go when the game starts, and it would be easy here for the player to miss an important encounter. Game play was reasonably well implemented, except for the moment where the player comes across a group of zombies who are impossible to harm, but these can technically be avoided or outrun.

6.3.3.3 Key game elements

Before presenting the narrative elements within the games, a brief discussion of some other key aspects of the games which have relevance to the analysis is given.

Choice

Some of the games examined gave very little narrative choice to the player, but others ensured that the player had different options to choose between. Being able to make choices for their

character as part of the enacted narrative can give the player a sense of agency, although as discussed Chapter 2, in many cases (even in commercial games) the main plot will be pre-configured and choices will only be about relatively superficial issues. In most games created by the young people there was one intended path for the enacted narrative, and alternative choices to this lead to dead ends, such as the player being attacked by a character who was crucial to the story, ending in the death of one of them. In some games the designers worked to give alternate choices which were not dead ends, but these tended to all lead to the same outcome, despite the appearance of choice.

Gameplay

Some young designers ignored gameplay, whilst others focused on it and paid less attention to other aspects such as the narrative. With this game engine and toolset, the gameplay which is most prevalent is that of fighting. Items can be placed in an area for the player to find for gameplay purposes, but these stand out unless they are integrated into the narrative. The other gameplay elements are pre-determined by the game engine; the way players move around, pick up items, access their inventory and converse with other players. The basic mechanisms for fighting are also pre-set, however the designer can set characters' strength levels and other combat related properties to set the gameplay for fighting.

James (W NT-T) worked in the gameplay to ensure that all battles are challenging but winnable, given a reasonable level of difficulty for the player. Richard (W B-T) also got the challenge level right in his game, and set up rewards for completing fights, such as treasure in the room where some hostile zombies are. Kofi (W B-T) put in some battles which were much too difficult and could prevent the player from progressing in the game.

Point of view

In single player role-playing games the perspective is always that of the player as active protagonist. The story plays out from their point of view, although it is possible to change the camera angle to a third-person perspective where the player can be seen at a distance alongside all other characters. This is a fairly superficial change however, and the fact that the action and whole presentation of the game events follow the position of the player make this first-person perspective unavoidable. However, in some games we are given the sense of a narrator in the pop-up messages which appear within the game. These tend to be written in the second-person and constitute instructions for the player, although there are exceptions to this.

Karen (W NT-T) has a pop-up message written in the first-person plural, implying perhaps a narrator who is following the player on the journey, or possibly recognising the duality of the player outside of the game and the player character within the game whose role is being

assumed. Kofi (B-T) takes a much more business-like approach to his pop-up messages, using a second-person voice and giving the player clear instructions.

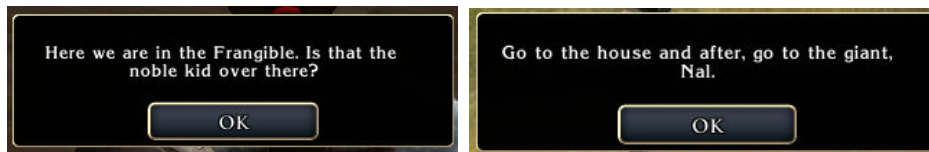


Figure 6.17: left – Karen’s pop-up message, right – Kofi’s pop-up message

6.3.4 Narrative elements

In this section, the multimodal writing skills demonstrated in the games are discussed with reference to the key narrative elements which they are used to convey. For each category, a few example games are picked to illustrate the way in which the games embodied these elements, with screenshots where these help the explanations. At the end of each sub-section, the remaining games are discussed briefly with respect to the element in question, to give an overview of the extent to which the example games chosen are similar to and different from the other games.

6.3.4.1 *Backstory*

Backstory is discussed by Chatman in terms of exposition (Chatman 1978, p. 67), which he characterises as the function of providing the audience with necessary information about events which took place and characters involved before the narrative begins. In the context of games, and using Jenkins’s terminology, this is embedded narrative information which is not part of the enacted narrative within the game (Jenkins 2004). This information is often crucial to understanding why the story progresses as it does, and why characters behave the way they do. A key narrative element within games is the backstory of the player character themselves, and past events that have taken place in the setting they find themselves in. Additionally, the backstory can sometimes provide key motivation for the player’s goals. The backstory is not always presented at first; in some games the player is slowly fed information which explains the backstory and the setting as the game progresses.

In the games examined in this analysis it was clear that some designers had worked hard to convey the backstory and the story to come, as well as explaining what was happening as the game progressed, whilst others felt it to be less important. The most common way of giving the player information about backstory was using text in conversations, but there were also some examples of visual conveyance of embedded narrative through ‘staged areas’ (Carson 2000, quoted in Jenkins 2004, p.127). There were few recorded instances of sound being used to contribute to backstory, and action (by definition) was used to convey enacted narrative rather than elements which took place in the past.

Example games

James (W NT-T) revealed his game's backstory in a very effective way. The player starts out in their character's childhood bedroom and gets a sense of playful pursuits from the dice and cards laid out on the floor, but also a sense of more serious endeavours from the scrolls on the desk. There is a slight input from text to back up the sense that this is the character's own house, as the area title (visible on the gameplay screen) is "your house upstairs". This subtle start is further developed in a more explicit way by the conversation the player has with his father on going downstairs; here we find out that the player, now 18, has reached the age when he is no longer a child and must go out and seek work. Another side to his character is portrayed through a conversation with a farm hand, who it is revealed has worked for the player's father for many years. Through conversation with him the player gets a sense that he resents them and has a low opinion of their intelligence. To convey his character's backstory then, James uses the visual design of settings in combination with text through dialogues and area titles.

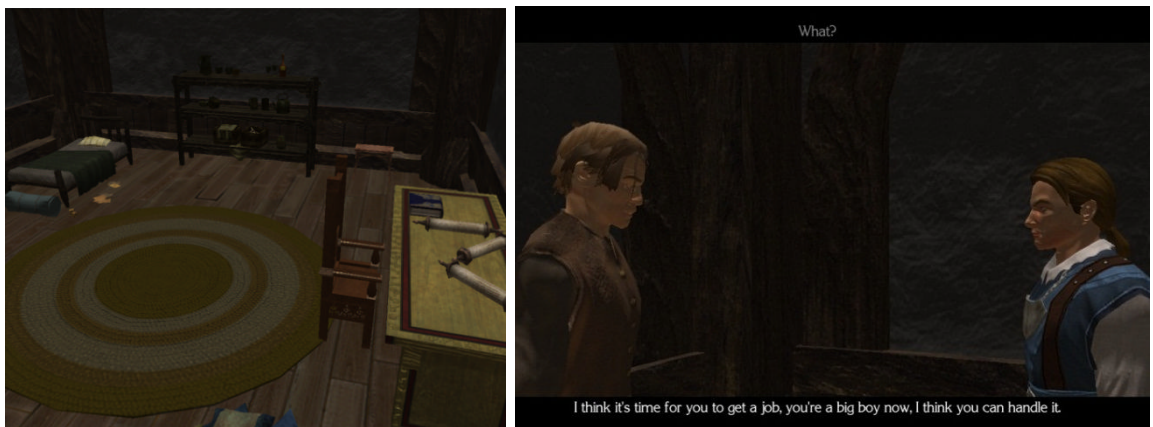


Figure 6.18: James's game, left – hinting at character through room design, right – developing player's backstory through conversation, and introducing plot of game

Kofi (W B-T) made it clear in his interview that he had very well-developed ideas about the backstory to his game. The details of the backstory are given to the player by a single character; Mr. Mou, who outlines the backstory in a conversation where he asks for the player's help. We do not get information about the player's own backstory except for the implication that he has woken up in a strange land which we get from the area name "where he wakes up". This idea is further suggested by the fact that the characters in the game are gigantic, and by Mr. Mou referring to the player as "my small friend", and informing him that he is in the "land of Am". Unfortunately the teacher who marked the game was unable to find Mr. Mou, and as a result failed to understand the significance of events and areas in the game. Kofi (W B-T) also used visual and sound elements to convey backstory, but these made most sense when considered in addition to the text based explanation. The sounds and sight of a burning town which the player

reaches (see Figure 6.3) are most clearly understood if the player has read about the destruction caused by the entity in the key conversation.



Figure 6.19: Kofi's game, left - back story is explained in a dialogue, centre - area name raises questions about player's backstory, right - area design complements and illustrates description

Richard (W B-T) also talked about a backstory to his game in his interview, explaining that the player's village has been destroyed by an enemy and is now left abandoned, and stating that the player wants to find the culprit. However, there is no reference to this event in the game, and no reference to the player's back story, although a dragon he meets refers to him as 'young traveller' suggesting that he is not known to him.

In Katerina's (S B-T) game there is no reference to the player's backstory, although from the visual appearance of the characters we can see that she is not from the pixie village in which she finds herself. We find out through conversations with the pixies that trolls have captured the village, and that there is a powerful weapon which could defeat them which many pixies have died trying to find.

Summary of other games

In Chris's (W NT-T) game the player finds out information about the backstory implicitly as the game goes along (that there is an evil overlord, that the player is working to defeat him), but only snippets of information are given. In Karen's (W NT-T) game we find out about the player character's back story life implicitly through the way she speaks with other characters, and the way they react to her, as well as getting explicit information about her owing a debt to the young noble's father. There is no backstory given in Alan's (W B-T) game, except for the information that the player is trying to get to a boat, told via a conversation.

In Susan's (S NT-T) game we find out through conversations that the player is on a mission for her master, and that the inhabitants of the land she finds herself in are living in fear of a witch who is believed to be coming to kill them all. Jane's (S NT-T) game gives no hint of a

backstory. In Jay's (S B-T) game there is clearly a battle underway, but there is no indication given as to the reason for it, or the identities of the warring factions. Zane's (S NT-T) game give no explicit backstory, but the area design includes burning buildings and a blood red lake which give the impression that some unfortunate events have befallen the village in which the player finds themselves. Owen's (S B-T) game does not include a backstory, but there is some indication that the player lives in the town which they find themselves in, as an internal area accessed from the starting area ('high street') is named 'my house'.

6.3.4.2 Setting

Setting encompasses the physical environment in which the game takes place, and in this respect correlates with Chatman's "items of setting" (Chatman 1978, p. 32). However, it can also involve the culture and society within which the game is set, as is captured by Jenkins's discussion of evocative spaces which evoke a certain atmosphere (Jenkins 2004, p.123). There is some overlap between setting and backstory as with Kofi's (W B-T) presentation of the 'Land of Am' which the player finds himself in through text-based conversations and visual appearance which tells of the events that that happened.

Setting is most obviously represented visually, in the design of the areas and objects within the game. In this respect all of the games convey a setting, but the level of coherence in the area design differs between games, and in some there is a sense of objects placed at random. It is only where areas are carefully designed to represent a convincing setting that we might consider that the designers have been successful in creating an evocative space. Sometimes text is used to reinforce the settings, for example a conversation line mentioning that the player is in a town, or cave.

To some extent the choice of setting is constrained by the availability of art resources within the toolset. There is a reasonably wide choice of textures and tiles, and the appearances of areas can be greatly customised though the use of objects and landscaping tools. However, most of the objects have a distinctly pseudo-medieval feel to them as they have been created for the existing Neverwinter Nights 2 role-playing game which has a specific setting.

Example games

A number of games included an inn scene, possibly because there are many art resources and objects which are suitable for such a setting. Similarly, there are many of these provided for forests or wooded areas. Figure 6.20 shows Chris's (W NT-T) inn area and James's (W NT-T) forest area. Both of these areas are reasonably coherent and give the player a convincing sense of being in a particular environment.



Figure 6.21: left – an internal area where the setting is an inn, right – an external area where the player is in a forest clearing.

In Alan's (W B-T) game the starting setting is not easy to make sense of. The player arrives in a large open space which has some trees, is littered with items including weapons and armour, has a strange assortment of creatures within it including bears and mechanical spiders, and a blood coloured sea at one end. There is also a building in the area which can be entered, and a sparse internal area which appears to be a house. These areas have elements of interest, but are not coherent enough to evoke a specific atmosphere or setting. Kofi's (B-T) game encompasses some reasonably coherent settings. When the game starts, the player finds himself in a grassy area surrounded by hills, from here he can enter an internal area which is set up as a store. Back in the starting area a conversation with a pirate standing by a ship on the shore takes the player to another continent where there is the city racked by flames.

Sometimes the setting changes as the game progresses. In James's (W NT-T) game the player starts inside his own home, a farm house, and then travels through the grounds of the farm before reaching the forest area shown above, while the final area of the game is set in the outskirts of a city. In some games, areas which follow on from one another can have drastically different appearances, signalling a movement between worlds. For example, in Chris's (W NT-T) game he starts off on a normal looking farm, but then travels down a well to hell. There are some red lakes which are evocative of hell, but it is only through textual means (the area name and a conversation line) that the player is likely to get the link.



Figure 6.22: James's game, left – player starts in a desert environment, right – the adventure quickly takes the player to a very different environment; hell.

Summary of other games

No games gave a specific indication of the time period in which they were set, but all had an implied pseudo medieval setting by virtue of the art resources used. Karen's (W NT-T) game is set in a town. The settings are conveyed visually through the area design, but the sound of birdsong is also used in a docks area to add to the atmosphere. Richard (W B-T)'s game begins in a forest area, and from here the player can enter a building and cross to an internal area in the style of a manor house. In a slightly jarring transition the player can leave the inside of the house through a trigger on the floor and be transported to a completely new external area which is different from the area by which they entered the house. This area is a sparse village with two buildings, both of which can be entered, leading to largely empty internal areas.

In Susan's (S NT-T) game the starting area is green and filled with trees with a lake in the centre. Entering the only building in the area takes the player into an internal area set up as a house. Katerina's (S B-T) game takes place within a single area which is grassy with a wooded area and a lake. Jane's (NT-T) main area is green, and also has a lake, but apart from this it is sparse. The player can enter a building in this area and come to an internal area which is empty and hard to interpret. Owen's (B-T) game is set in a town, with the starting area named as 'high street' and an internal area accessed through one of the buildings named 'my house'. Zane's (NT-T) game is set in a town with a range of buildings, none of which can be entered, and a few unusual elements such as a building on fire and a blood coloured lake. Jay's (B-T) game is also set in a town, and the game starts in the middle of a battle scene. The battle continues inside one of the buildings which is empty except for more hostile creatures.

6.3.4.3 Characters

Characters are one of the two key story existents within Chatman's narrative theory (Chatman 1978, p. 32). As enacted game narratives are mainly conveyed through characters' actions and conversations, characterisation is also an extremely important narrative element within games. In most games (as with other forms of fiction), there will be some characters who serve simply as extras who the audience does not get to know in any depth (classed as elements of setting under Chatman's theory). However, when it comes to the player character and other central characters, some development and presentation of personality or goals and desires can be crucial in portraying the plot. Designers took a range of approaches towards communicating information about characters. Some of the young people worked impressively hard on characterisation, whilst others struggled to flesh out characters at all, and appeared not to have thought about them.

Text in dialogues came through as a crucial way of conveying character traits to the player, but other elements also have power. The visual and action modes were particularly effective when

used to reiterate and extend upon points raised in dialogues. The most effective examples used clever interplay between textual elements such as conversations and appearances and actions.

Example games

Susan's (S NT-T) game showed strong characterisation, using a combination of well-written conversations with carefully chosen language, and appropriate character names and appearances adding to the effect. The two most well developed characters are a Dryad named Carader, who takes an almost maternally protective stance towards the player, and the main enemy, a witch called Gwenon who initially comes across as quite charming when the player first meets her without realising she is her foe.

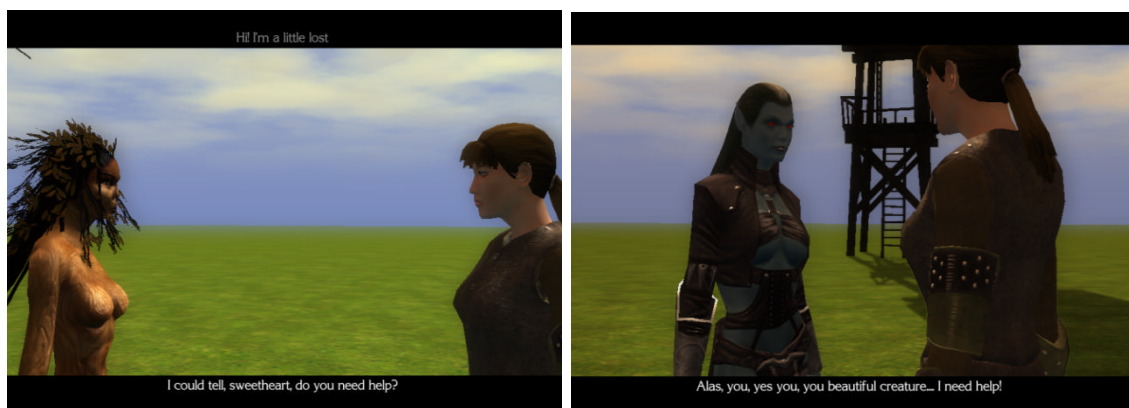


Figure 6.23: Susan's game, left – Carader, a generous and slightly maternal character who helps the player, right – Gwenon, a dangerous but charming enemy

In Karen's (W NT-T) game the main character other than the player is introduced in a very effective way through text with support from the visual mode. The first character the player meets tells her that someone has been asking for her, and that "E were a noble or some such". By the dialect these characters speak and their dropping of consonants we get a clear sense that they are not noble themselves. In this conversation the player is advised that 'the noble' has been sent to the local inn to look for her, and both characters agree that she ought to find him as he might be liable to get himself hurt there. Upon arrival at the inn the player finds the young noble in the middle of a conversation with some locals. By catching the end of the conversation before she arrives we get a sense of what might have happened had the player not turned up when she does. Jarus, as we now find out the noble is called, appears completely out of his depth but oblivious to the danger he is in, blithely asking for Nicola in very upper class language ("I say, chaps..."), which makes him stand out even more than his smart and fresh-faced appearance already would. With the visual working in combination with the content and style of the dialogues we quickly get a powerful sense of what this character is like.

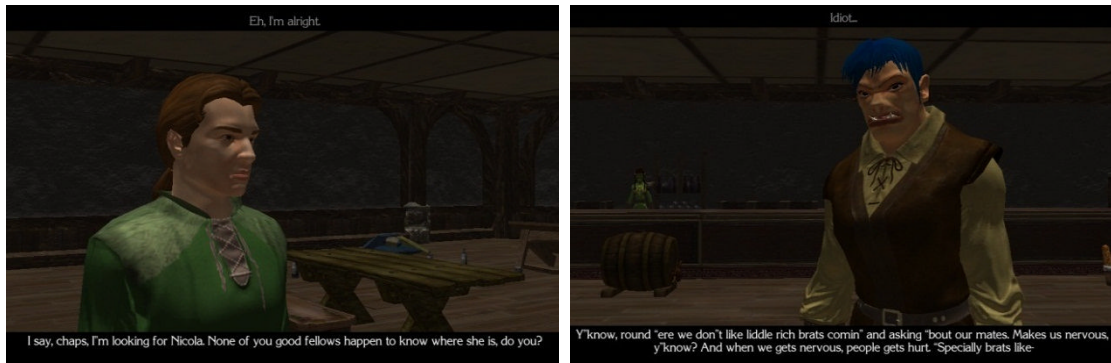


Figure 6.24: Karen's game, left – Jarus comes across as naïve and slightly arrogant, and appears fresh faced and well-dressed, right – Nicola's friends are portrayed as being tough and rough

Summary of other games

James's (W NT-T) game has very strong characters, in particular the player character, whose history and personality we find out about through seeing his home and reading what other characters say to him. Richard's (W B-T) characters are not well developed. We do not get any real idea about the motivation or goals of any of the characters, including the player. However, there is an interesting juxtaposition with a spider character who has a scary visual appearance but offers guidance to the player and tells him not to be afraid. Chris's (W NT-T) game has a considerable number of characters, and with all of them we find out a little about their motivations, but none of the characterisation goes into any depth. In Alan's (W B-T) game there is no characterisation evident, we do not find out anything about any of the characters apart from their name. Kofi's (W B-T) game has two characters who the player finds something out about, but neither of their personalities or motivations are really explored. Katerina (S B-T) has a number of characters who are of some interest, but none have distinct personalities which are presented to the player in any depth. Owen (S B-T) makes some attempt to give the player information about the player through his house, and the talking chicken character is amusing if not developed in depth. Jane (S NT-T) , Zane (S NT-T) and Jay (S B-T) do not have any characters of interest in their game.

6.3.4.4 Plot

Here plot is used to mean the enacted narrative which the player can take part in through the game. This includes the series of events that happen within the game and the way(s) they are presented to the player. So whereas a backstory relates to events which supposedly happened before the game begins, the plot concerns the story events that take place within the game, along with the order in which they take place, and the connections between them. In some narrative theories plots require causation (Forster 1927), but Chatman argues that the important element is coherence (Chatman 1978, p.31). The audience is capable of inferring a huge amount about a narrative, but the identity of the characters and settings must be consistent. In a game, as the

player is taking an active role with the enacted narrative, the need for causality may be stronger, as it is linked to the player's sense of agency.

Events and encounters within the game carry an important power because they are the main way in which the enacted narrative takes place. As the games are interactive, there are a number of orders in which the events can take place, meaning that the plots are branching, and certain potential events may not happen depending on the actions the player takes. In many cases the designer makes it clear to the player that there is a suggested order and structure (or 'golden path') which should be followed for maximum plot coherency, and although this could potentially detract from the player's sense of agency, this can be an effective way to communicate the main story to the audience.

Many of the young designers did not manage to complete their ambitious games within the time available, so there were many games where the conclusion of the plot is left hanging. However, it is possible to examine the sections that were completed and gain a further understanding about their intentions from interview and survey data. All games contain events, but a crucial factor which reflects the plot quality is the extent to which those events are explained along with the connections between different events. Where things happen seemingly at random without the player understanding why something is happening or the motivations behind other character's actions, there is very weak plot coherence. For this reason, understanding the goals the player has within the game can be a crucial element of the plot.

Example games

Although Richard's (W B-T) game has some interesting encounters in it, there is no thread connecting them, meaning that they seem to be without purpose, and we do not get a sense of what the player is trying to achieve and why. This leads to the feeling that the series of events are unrelated, and not of obvious significance. Richard (W B-T) talked about a plot as well as a backstory to his game in his interview, explaining that the player's village has been destroyed by an enemy and is now left abandoned, and stating that the player wants to find the culprit. However, there is no reference to these events in the game, and when the player does come across a sparse village it feels unfinished rather than abandoned.



Figure 6.25: left - player is referred to as ‘young traveller’, right - ‘abandoned village’ is unlikely to be understood by player as it is not referred to as this within the game

Katerina’s (S B-T) game has a short but clear plot, and is probably the closest to a finished plot out of all the games examined. The player is given a goal early on, and is given guidance on how it can be achieved. The characters and their behaviours are all well explained and make



Figure 6.26: Katerina’s plot is clear and easy for the player to understand

sense in connection with one another. The game begins with the player meeting some pixies who ask her to help them get rid of the trolls that have overrun their village. In conversation with them, the player is told about an ice arrow which can kill any living creature, but is warned that many have died looking for it. Nonetheless, the pixies ask the player to try and find it and encourage her to find some wolves, who can apparently give more information about its whereabouts, whilst giving another warning that some of the wolves are not to be trusted. Sure enough, one of the wolves gives specific advice about the arrow explaining that it is guarded by a dragon behind the mountains, but another will laugh and attack the player if she asks for help. The dragon turns out to be too powerful to beat, but the player is still able to pick up the ice arrow (visible behind him) with little difficulty.

In Kofi’s (W B-T) game there is a plot to be uncovered, although it relies on the player finding the character who tells the back story in order for the connection between events to be understood. With most of the games there are crucial encounters without which the plot will fail to make sense, but in Kofi’s case it was particularly easy to miss this encounter.

Chris's (W NT-T) game is an example where there is a plot but no backstory. All encounters the player has are linked to the player's overall goal of defeating the 'evil lord' of the land, but we do not find out any backstory which might indicate why the player has taken this goal on, what sort of life he has led before this point, or what kind of evil deeds the lord has carried out.

In Alan's (W B-T) game the player mentions to another character that he wants to get to a boat on the other side of the starting area, and this character, along with two other people, join with the player and start following him. If the player travels across the land he will be attacked by many creatures of differing types, and should eventually find the boat, but there are no further actions that can be taken. In this way, there are events which happen within the game, but they are not explained or connected, meaning that the plot is not compelling.

Summary of other games

James's (W NT-T) game has a strong and interesting plot which connects the various in-game events clearly through conversations, and visual elements. Additionally, action-based elements such as fights, and characters running over to speak to the player, play an important part in his plot. Susan's (S NT-T) game gives some indication of a plot through conversations, but some elements are not fully explained, and guidance is poor, leaving the player struggling to work out the significance of some characters and events. Owen's (S B-T) game has little plot. The player finds out that they ought to seek two dragons, but there is no indication of why, and upon finding the dragons, the player cannot interact with them except to fight them, which leads to no discernible outcome. The games created by Jane (S NT-T), Zane (S NT-T) and Jay (S B-T) have no plot as far as a player could tell.

6.3.4.5 Guidance

In linear fiction the author must guide the reader through a work, providing a structure for their imagination which leads to successful co-construction of the story between the writer and the reader. The reader still has to take on the task of drawing inferences, the "narrative filling-in" described by Chatman (1978, p.31). Sometimes the reader is deliberately guided down a misleading narrative thread in order to put them off the scent of the real turn of events. In narrative-based games however, it is impossible to underestimate the importance of guidance. If the player does not know where to go or what to do then the narrative simply will not progress. This requirement is not limited to narrative-based games, however. Implementing effective, but subtle, guidance is one of the key challenges all game designers face, as highlighted by Jenkins and Squire (2002). There are a number of different ways in which the player may be guided by the designer: each of these is addressed separately below.

6.3.4.5.1 Where to go

The player, upon arriving in an area, must be given some indication as to where to go next, and there will be points throughout the game where the designer must guide them spatially. Methods of conveying this information range from subtle visual cues such as pathways running across the areas, more explicit visual directions in the form of signposts showing arrows, instructions during conversations referring to points within the landscape, instructions to follow a character walking a pre-scripted path, and a combination of more than one of these different factors. In some cases the only guidance given is proximity or the player's starting direction. To some extent, designers can assume that the player will explore the game areas. Subtle indications, for example, a single door visible in front of the player when she enters the game, can be enough guidance in certain situations.

Example games

In James's (W NT-T) game the talent scout character implies through dialogue that the player should come with them. When the conversation ends, the character starts walking away following a scripted route, and the player also sees a pop-up message box instructing them explicitly to follow the character. The textual and action modes work well together to convey the meaning and guide the player effectively.

In Karen's (W NT-T) game a character tells the player to go to the pub on the other side of town. This text-based information can be used in combination with the area design, which splits the town quite clearly into two, the sign on the building which indicates that it is a pub and the labelling of the doorway with the aforementioned name of the pub. A tooltip appears when the player mouses over the door, making the name visible, as shown to the left in Figure 6.27.



Figure 6.27: left – pub exterior in Karen (NT-T)'s game with pub name visible in tool tip, right – pop-up message attempts to direct player but is too vague

The combination of text in the tooltip and the visual appearance of the building communicate to the player that this is the right place. Once inside the pub the player is shown a pop-up message

saying that the person they seek is ‘over there’, but since there is a room full of people and no indication about direction this is not particularly helpful for the player.

In Alan’s (W B-T) game the player finds out through a conversation that he should head to a ship that is leaving ‘from the other side’, but as they are in one corner of a grid and there is no sign of the boat from the distance at which they stand it is hard to know which way to go. Similarly, a pop up message tells the player to go to a house at the start of Kofi’s (W B-T) game, but it is not possible to see the house, and the player starts facing the wrong direction. This lack of spatial guidance let down other aspects of Kofi’s (W B-T) game such as the backstory, because it was easy for the player to miss crucial information. Text instructions can be too vague on their own, and sometimes need to be complemented by visual indications.

Sometimes paths can be enough to guide the player, but in Richard (W B-T)’s game the player starts out in the middle of the path (towards the top-left of the view shown in Figure 6.29), so it is not clear which way to go. However, if they travel a short distance along the path they see an arrow pointing in one direction. This is effective, but works at the expense of breaking the realism as it is unlikely that there would be a permanent sign pointing in one direction with no indication of why it is there or to what it points.



Figure 6.28: left – path in Richard's game, right – sign from Richard's game

Summary of other games

In Susan’s (S NT-T) game the guidance is quite poor. The player starts out facing in the direction of a character who will become her helper, but after this conversation there is no further directional guidance. Katerina (S B-T) guides the player effectively through a combination of text instructions in conversations and key area design features which are visible from some distance and which are referred to in the conversations. Owen (S B-T) gives some minimal guidance through the player’s starting position near to a character with a conversation

(although facing in the wrong direction), and through directing the player towards the characters they must find next (although buildings in the way make it hard for the player to see those characters at first). Jane's (S NT-T) game has very poor directional guidance, as the player starts facing in the opposite direction to the only character who the player can speak to in the game. Jay (S B-T) and Zane (S NT-T) also provide no spatial guidance for the player.

6.3.4.5.2 What to do, and how to do it

Guidance to the player about what to do and how to do it most often concerns their goals within the game. This information is frequently coupled with instructions about where to go, but relates to a different type of guidance. Whereas area design, paths and signs can indicate visually where the player should go, what action they should take often needs to be spelled out through text. As the designers were using an existing game engine there is a limited set of possible actions which can be carried out within the game world. These can be summed up broadly as walking or running somewhere, opening or closing something, entering a door or trigger, picking up an item, using an item or placeable object, talking to a character or fighting a character. Within the game engine there are dynamic mouse icons which give the player feedback about the type of actions which can be carried out on any given object or character. Friendly characters invite the player to try talking to them through the icon turning to a speech bubble when the player moves the mouse towards them. Similarly, hostile characters invite the player to start a combat with them through a sword icon.

In some cases the instructions about what to do on reaching a certain location can be given implicitly through actions, for example, if some creatures begin attacking the player then the implied message about what to do is to defend oneself. In this way the information is conveyed through action on a just-in-time basis. In other cases the player needs to be given more specific advice about what to do, for example picking up a certain item. Where explicit information about what to do was given this was always through text in dialogues or pop-up messages in this set of games.

Example games

In Katerina (S B-T)'s game the player is given hints about what they should do through conversations, and this text-based information works in conjunction with the dynamic icons to give the player a more complete picture of the actions they are being encouraged to take. For example, the player is told to go and talk to some wolves, but also warned to "watch out" because some are "nasty". Here the player is explicitly told to talk to the wolves, but also given a warning to be prepared for a fight.

When one of the wolves does attack the player after she tries to speak to him, the player must defend herself. Another (slightly more helpful) wolf tells the player where she can find the ice arrow she seeks, but also implies that she should be prepared for a tough fight by saying “...good luck. It’s guarded by the dragon, over there, behind those mountains...”. This, combined with the feedback of an attack mouse appearing when the player hovers over the dragon, makes clear that her goal is to fight the dragon to get the ice arrow.



Figure 6.30: left – the players goal of defending herself is made clear through actions, right - a friendlier wolf gives information about the next task

In Kofi’s (W B-T) game the player’s main goal of collecting the missing orbs is explained first through a conversation and later in a pop-up text box, as shown in Figure 6.31.

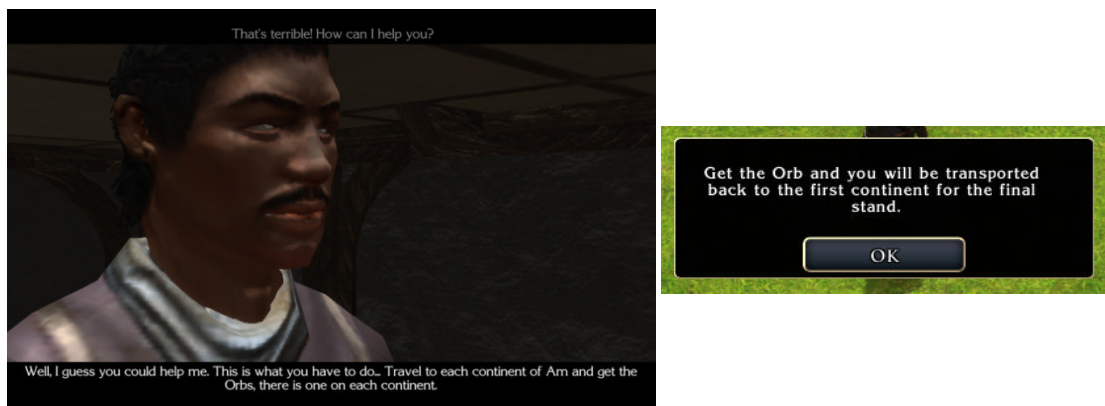


Figure 6.31: left - the player is initially told what to do in a conversation, right - more specific instructions are later given through a pop-up message

Summary of other games

Susan’s (S NT-T) game passes on information about what the player should do mainly textually through conversations, with some implicit hints through icons and actions when creatures are hostile. Karen (W NT-T) communicates the goals to the player through text in conversations and a pop-up message to reiterate previous information. Chris (W NT-T) also relies mainly on conversations to give goal-based information, with icons also used to indicate enemies. James

(W NT-T) uses conversations and pop-up text-boxes effectively, but also relies on indications from icons. Alan's (W B-T) game does not make any goals clear to the player except that they should get to a boat, which is communicated through a conversation. Richard's (W B-T) game also seems to lack any explicit goals, but sub-goals such as getting some treasure are explained through conversations. Owen (S B-T)'s game has one minor goal, which the player also finds out about through a conversation. Jane (S NT-T), Jay (S B-T) and Zane (S NT-T) all seem to lack goals in their game, except for a basic implied goal that the player should kill hostile creatures as indicated visually by the dynamic icons and the actions of the hostile creations.

6.3.4.5.3 When to go somewhere or do something

Along with information about where the player should go and what they should do, there is also often a need to guide a player about the order or timing of the actions they should take. Players have choice within the game, and they may not take the advice offered. In commercial games designers spend a huge amount of time and effort supporting player choice, both in terms of the explicit choices they make, but also in terms of the order in which they choose to explore the game world and carry out actions. However, no matter how much flexibility is built into the game, there will always be some 'golden' paths which are the expected traversals, and there will always be points in the game where the ordering of what follows next is tightly controlled. Sometimes the only step the designer can take is to ensure that if players do things in the 'wrong' order then there are no glaringly out of place elements which break the fantasy of the story.

The provision for ordering is related to the success of the plots. In these games the limited period of time available for the designers is reflected in the extent to which they struggled to support player choice in terms of ordering of events.

The key modes used to convey ordering information were textual and visual. Some games dealt with this issue by providing very clear textual instructions to the player about the intended ordering of events, and a few even use sophisticated techniques such as adding scripts to conversation lines to ensure that certain conditions have been met before the next part of the story unfolds or the player can progress to a new location. Implied ordering through visual location and area design is used successfully by some games, for example, proximity or starting direction used in conjunction with pathways to indicate intended ordering, as mentioned above. A number of games fail to provide enough guidance about ordering, with consequences for the plots.

Example games

Karen (W NT-T) informs the player about ordering using location and conversations, and uses scripting to ensure that specific conversation options and their resulting actions do not happen in the wrong order. The player initially starts out facing a character who will tell them that the noble kid is looking for them, and direct the player to the local inn where he can be found. If the player chooses not to follow these instructions (or gets distracted on the way), and decides to speak to the woman guarding a door nearby the pub, they are told that it is not yet time for them to travel through this door, and instructed once again to find the noble in the inn.

In Kofi (W B-T)'s game the player is told to "[g]o to the house and then the boat" in a pop-up box. These straightforward instructions are very clear on ordering, if a little short on reasons and specific directions. In Katerina (S B-T)'s game we are told to go and talk to the wolves and advised they will help the player to find a powerful weapon. In this way the player understands that talking to the wolves is the first step to take in finding the ice arrow.



Figure 6.32: left- in Karen's game scripting is used to guide the player through conversations, right- Kofi uses a more to the point method through text-boxes

In Susan's (W NT-T) game, although there was an interesting plot line and well-developed characters, it was very hard to know what was going on because there was no indication of the order in which things should be done. The player started out facing in the direction of the person the designer seems to intend should be spoken to first, but after this initial conversation there is no indication of what to do next, or the related question of where to go.

Chris's (NT-T) game initially fails to provide any information about order, as the player starts out in a field with two main objects of interest visible: a farmhouse and a well. After trying the different orders it is clear that the player is supposed to go into the farmhouse first, as this introduces the main goals of the game, and then progress down the well to the subsequent areas of the game. However, the player lacks the required ordering information, which potentially jeopardises the plot of this game.

Summary of other games

James (W NT-T) uses conversations and area design effectively to guide the player event by event in a way that seems natural, to a large extent relying on the guidance about location to take care of the issues around ordering. Richard (W B-T) uses conversations and area design in the form of pathways to guide order as well as direction. Alan (W B-T) uses a conversation with a nearby character at the start to indicate what the player should do first, but makes no mention of a house which the player can enter, leaving it unclear when or if this is intended to happen. Owen (S B-T) takes a similar approach; with an initial conversation directing the player towards the first (and only) goal of the game. Jane (S NT-T), Jay (S B-T) and Zane (S NT-T) do not give the player any indication about ordering.

6.3.4.5.4 Why the player should do these things

Whereas the three previous aspects of guidance were largely to do with conveying information to the player, the issue of why the player should feel motivated to do the tasks that are suggested can also require the communication of ideas and emotions. In some cases these motivating elements may be linked to the backstory, whilst in other cases they come out through the plot within the game. This type of guidance was lacking from most of the games, but evident in a small number. In some cases the player had to trust that what they were being guided to do was worth doing, and only later found out more information about the reasons behind them.

Example games

In Katerina's (S B-T) game the motivation is a simple appeal for help expressed in a conversation with the first character the player meets. The player is not given an incentive or reason from backstory to back up this request. In Richard's (W B-T) game the motivations are more mercenary, and the player learns through a conversation that some zombies are protecting treasure nearby, giving an implicit goal. In Karen's (W NT-T) game we find out fairly late on that the player owes a debt to the noble boy's father, and the player must take it on trust that there is a reason this boy should be sought out at first. James (W NT-T) gives a strong motivation for the player through the back story and characterisation in his game. Through a conversation with his father we find out that it is time for him to go and seek his fortune, and we also find out that, touchingly, his father has managed to get him a job with the exciting 'mage station' for whom he has always wanted to work.



Figure 6.33: left – in Katerina’s game the motivation is a simple appeal for help from weak creatures who have been overrun by stronger creatures, right – in Richard’s game the goals are more mercenary

Summary of other games

Susan (S NT-T) also relies on getting the player’s buy-in through giving them a choice to agree to help the characters who ask to be rescued. Chris (W NT-T) explains the motivation behind the game’s goal through a pre-existing wish on the player’s behalf to overthrow the evil overlord of the land, the player does get an apparent choice about whether to help another character in the battle against the overlord, but they have already expressed what they plan to do in conversation with other players. The player is given motivation in Kofi’s (W B-T) game in a direct appeal from a character during a conversation. Alan (W B-T), Jane (S NT-T), Owen (S B-T), Jay (S B-T) and Zane (S NT-T) all neglect to communicate motivations for the player in their games.

6.3.4.6 Themes

The themes of the young people’s games emerged through a combination of the above narrative elements. Not all games had clear themes, and it became apparent that in order to convey thematic elements, the designer must be successful at achieving lower level elements such as guidance. Where the more basic requirements (like ensuring the player knows where to go) have been met, there is a chance for an emergent richness, conveying more complex elements like themes.

The themes that came through most strongly in this set of games were:

- Quests to fight evil – Kofi (W B-T), Chris (W NT-T), Katerina (S B-T), Susan (S NT-T)
- Injustice of privilege – Karen (W NT-T), James (W NT-T)
- Becoming an adult – James (W NT-T)
- Family – Karen (W NT-T), James (W NT-T)
- Friendship and betrayal– Karen (W NT-T)
- Work/employment/adventuring – James (W NT-T), Susan (S NT-T), Richard (W B-T)
- Humour – Karen (W NT-T), James (W NT-T), Chris (W NT-T), Kofi (W BT-T)

The most common high level theme within these games was the idea of the player taking on quests to tackle an evil being. In Kofi's (W B-T) game the player is asked to save the land from an 'evil entity', and can clearly see the destruction around the land. Chris (W NT-T) similarly had created an evil overlord for the player to defeat. In Katerina's (S B-T) game the enemy is some trolls who have overrun a pixie village, and in Susan's (S NT-T) game an evil witch is the culprit.

Two games raised issues around the injustice of privilege through their narratives. Karen (W NT-T) managed to introduce this powerful theme by drawing a contrast between the privileged and advantageous life the noble has enjoyed up until the point of the game, with the hard and rough life of the player and her counterparts. This was primarily conveyed through dialogue between the characters, both the words spoken and the dialects and language used, but Karen has also used visual elements to reinforce and extend the message. Most of the characters in the game speak roughly and colloquially, as indicated by the dialect style of writing used in the conversations, but the two characters of more privileged background speak in a more 'fancy' way: Jarus and the elf. These two are also dressed in bright green outfits, whereas the rest of the characters wear dark and dull clothing. James (W NT-T) raised this issue more subtly through a conversation with a resentful farm hand who clearly felt that the farmer and his son had low intelligence and did not deserve to be in positions of power.

James (W NT-T) also conveys the theme of the transition from childhood to adulthood, and makes good use of visual design in addition to the elements conveyed through dialogue and other textual elements. In his opening area there are no conversations or other textual elements, we simply find ourselves in a young adult's bedroom – there are cards and dice strewn across the floor, but there are also scrolls on a desk indicating the need for more serious activities to be carried out. The related theme of family comes out through conversations with the player's father, where we find out some touching details about the steps he has taken to help his son on his journey. Karen's (W NT-T) game conversely features a troublesome sister who turns against the player and betrays her. However, themes of loyalty and friendship also come out through conversations with the player's fiercely protective friends.

The need to make a living in life is something which a number of games touched on. In Richard's (W B-T) game there is treasure which the player is encouraged to collect, although we get no further background to this need. Susan's (S NT-T) game sees the player sent on a mission by her boss, and the player has to choose whether to jeopardise that job to help the villagers she comes across on her way. James's (W NT-T) game sees the player being faced with the need to leave his father's home and make his own way in the world.

Although not strictly a theme, a number of games use humour in interesting ways. In Karen's (W NT-T) game the humour comes from the stupidity of the noble kid, and from side characters within the inn. For example, a humorous popular culture reference is made by the vampire in the inn, who explains that this is the only place where he can go without being mocked by 'that sparkling person' – a reference to the vampire from the teen hit series of books and films, the *Twilight Saga*. Chris (W NT-T) included some drunk characters who must be sobered up before they can help the player, and an 'alcohol antidote' potion which must be administered.

6.4 Discussion

This chapter presented two analyses of the games created during the evaluative field studies to examine the writing skills demonstrated (RQ1), explore potential differences in games created with and without additional support (RQ5) and address the influence of context on the games created (RQ7). The findings are discussed in relation to these research questions below.

RQ1. Are writing skills demonstrated in the narrative-based games created by young people? If so, which skills are demonstrated, and how is writing used in conjunction with other representational modes?

The multimodal analysis allowed examination of how the games conveyed narrative elements, including the modal combinations used and the success of the method of communication. Written text was particularly important for conveying information to the player in a range of narrative functions. In some of the most successful examples of conveying narrative elements to the audience, text was used very effectively with visual elements. Actions were also very important, but in most cases required the support of text and visual elements in order to be coherent. Audio was the least important mode in the games examined in this analysis.

To convey backstory, text was particularly important. Text in conversations was a key way of giving the exposition, and text in other formats such as pop up text boxes was also used. In some of the most effective examples, text in a conversation was used in conjunction with visual area design. In cases where visual elements were used without text it was sometimes hard to interpret the meaning, and it was only through examining interview transcriptions that it was possible to understand the significance of staged areas. Guidance was also crucial: in one example the backstory had been explained in detail through a conversation, but the expert rater never came across the character with this conversation due to poor guidance, so the back story was not clear, and the subtle complementing of the back story with a staged area was not understood. Actions were not used to convey backstory for the most part as they related to the present enacted narrative, although the hostile nature of some characters which caused them to attack could be considered as indicative of some implied backstory which might explain why

the creatures were hostile towards the player. Audio was used in rare cases to add to the atmosphere, but this was always in a minimal role in these games.

In conveying setting the primary mode used was visual. The area design was very important in giving the player information about the game setting. Where the setting was not clear, this was usually due to a lack of coherence in the objects placed within an area. In some cases text was used effectively to reiterate and clarify elements of setting, such as identifying an area as 'hell' in conversations and the area name. Again, audio was used minimally to add incidental setting information such as the presence of birds, or the sound of already visible flames. Actions were not used to convey setting information in this set of games.

For characterisation, the text and visual modes were again the most widely used. There were some examples of particularly skilled use of language, such as dialect to reflect characters' social status, backed up with visual appearances which reiterated the sense of person. Generally the visual and textual modes were used to reinforce information conveyed in the other, but in a few cases there was a juxtaposition, such as a spider who looked scary but said friendly things once spoken to. Actions were used to convey some elements of character. In the most heavy-handed examples this was limited to an attacking action indicating a hostile character, but there were also examples where the player was given an important or useful item by another character, or where characters join in battle in support of the player. The sound mode did come into play in conveying characters, as designers were able to choose an appropriate voice when designing characters. These were mostly chosen appropriately, but as there was a limited range of voices and only pre-recorded lines which were spoken, this mode was still more in the background than the other three.

The action mode came in to play most noticeably in conveying the plot; the enacted narrative in which the player takes part. Here, actions were most effectively used in conjunction with the textual and visual modes. Actions included characters attacking other characters, giving and receiving items, travelling around and between areas, and following or being followed by other characters. In some cases these were actions performed by the player, and in others they were scripted or inbuilt behaviours carried out by non-player characters. All of the games examined had series of actions which could take place, but only some had what could be realistically be considered to be plots. These were those which had a coherent link between the actions and where it was possible to deduce reasons behind the behaviours and actions, most often where the action, visual and text modes were used in combination to move forward the plot and give the player the required information to understand the events. A particularly effective example involved a character running over to the player with information conveyed through a conversation, and then asking the player to follow him. This led the player through an area to a

transition, and explained the higher level significance of these actions well. Again, audio had a minimal role. It was used in battle sequences to support the sense of the action, but there were very few instances of the designers customising the sounds available.

Player guidance emerged as a very important component of the games in which worked alongside the portrayal of specific narrative elements. Successful guidance was a prerequisite for the conveyance of any narrative information, as players can easily miss key characters and areas without it. Information about where the player should go was given through the visual mode in many cases, with area design elements such as pathways, valleys, clearings and signs playing an important role. Text also had a key role in many cases, complementing the visual elements with specific instructions in conversations or pop-ups. Actions were also used effectively by some young designers, often in conjunction with text such as a conversation in which the player is instructed to follow another character. Guidance about what to do was given implicitly through actions in many cases, for example, the implied instruction to defend oneself when another character attacks. In other cases, visual cues such as changing cursors are relied upon, as well as the player's intuitive interpretation of the potential affordances of objects (e.g. doors can be opened, bags can be picked up). In the most effective games, text in conversations and other formats is used to reinforce the information which is portrayed through visual and action modes. Information about timing and ordering was mostly conveyed through text, but the visual element of area design was also relied upon for this. The motivational consideration of why a player might want to carry out certain actions was largely conveyed through text. In some cases it was left implicit in actions, but these were not very successful in giving the player a real sense of purpose.

Overall then, written text was a key transmitter of meaning in all games, but there were some skilful examples of other modes used in combination with text to great effect. A sophisticated use of language in combination with other modes was crucial for conveying the more interesting and complex elements such as themes. There were examples of effective usage of text in conjunction with visual and action modes across all groups, but the Narrative Threads Workshop group had noticeably more examples of this. In summary, there was evidence of the demonstration of traditional writing skills, but also of the multimodal composition skills required to effectively convey meaning through multiple representational modes.

RQ5. Are there noticeable differences between the games created with the additional interface support and those created without this support? If so, how do these games differ, and is there a difference in the writing skills demonstrated in the games?

The game rating scheme allowed further examination of the difference between games created by the different groups, and games created with and without the additional representational

support. In the school setting there were no significant differences between the two groups, although there was a trend for games created by the group who did not have the additional representational support to score more highly. One possible explanation for this unexpected trend could be that the limited time available for game creation in the school setting was not enough to allow participants to learn how to use all aspects of the toolset effectively, and the NT Toolset group had to receive demonstrations in using additional tools. Another possibility is that the pre-existing differences between the classes led to a slightly higher level of quality on the games examined. The classes were similar on overall measures such as means, but the standard distribution was higher in the Basic Toolset group, and there was a group of very high achieving pupils in this class. These were largely the pupils who scored best on game creation.

In the workshop setting the scheme-based analysis did show a significant difference between the games created with and without Narrative Threads. The Narrative Threads games were rated significantly more highly overall, and also on the sub-categories of Visually Interesting and Challenge. This finding, considered in conjunction with the lack of a significant difference in the school setting, may indicate that there is a floor effect in place. The school pupils had less time working with the toolset than the workshop participants, and it is possible that there is a minimum amount of time on project required before additional support tools can bring any benefit.

In the multimodal analysis the differences between the games were examined more qualitatively. In the school setting there were not any clear differences between the two toolset groups. In fact, there were only two games which had any real narrative content, one from each group. One of these games (created with the basic toolset) had a clearer plot and better player guidance, whilst the other (created with Narrative Threads) had more thoroughly developed characters. We cannot draw any general conclusions from the differences between these two games.

In the workshop setting there was more of a potential difference observed, as reflects the difference found through the rating scheme analysis. There were good examples of interesting backstory in games from both groups, and it would be hard to draw a distinction between the two groups on this element. However, when considering characters there was more of a clear difference. The most impressive examples of characterisations came from two games created with NT, whilst none of the Basic Toolset games showed particularly interesting characters.

The games created with NT in general showed stronger player guidance than those created without. There were a number of cases where key narrative elements such as back story had been thought through by designers using the Basic Toolset, but not effectively conveyed to the player. In the Narrative Threads games these elements generally came through more clearly to

the player. When considering spatial guidance the augmented map view may have helped these designers to develop a stronger sense of where the key story locations were, which may in turn have improved their effectiveness in conveying this information to the player. At a higher level, the picture of what the player should do and when should have come out to designers through the branching narrative diagram exercise. The other group carried out a paper-based version of this task, but observations suggested that they did not spend as long on it as the NT group did on the built-in diagramming tool. Guidance about why the player should carry out certain actions was lacking from many of the games, but seemed to be tied quite closely to character traits where it was present. There was not such a noticeable difference on this factor.

More of the games which had recognisable themes were created using the Narrative Threads toolset, and it seemed that effective portrayal of underlying elements and clear guidance was required as a precursor for this emergent narrative richness in the games.

RQ7. How can the broader activity context support game creation? How does it affect the usage of the additional support, the skills demonstrated in the games created, and any improvement in writing ability?

The difference in quality between the games created in the workshop and school setting was very clear. The most obvious reasons for this would be that the workshop participants spent over twice as many hours on the project, but the observations about pupils forgetting how to do things and losing track of their progress suggest that the very spread out nature of the lessons with large gaps between the time may have exacerbated the problem. Another factor which must be considered is the self-selecting nature of the workshop participants. The school pupils reported a fairly high level of motivation, but some pupils clearly lost interest as the term went along, and others had been disappointed that they could not create games of the sort they liked to play at home (e.g. *The Sims*).

6.5 Chapter Summary

This chapter has presented two complementary analyses of the games created in the evaluative field studies first described in the previous chapter. A scheme based analysis showed a dramatic difference in quality between the games created in the school and workshop settings, with the workshop games being rated much more highly. In the school setting, there was no significant difference in the quality of the game created with and without the additional representational support. However, in the workshop setting the games created using Narrative Threads were rated significantly more highly on a number of categories, and on the overall summative scores. The multimodal analysis allowed a more in-depth examination of twelve of the games from the evaluative studies. The most successful games in each setting and group demonstrated an

impressive use of some complex writing skills, including effective use of writing in combination with other representational modes. Mirroring the scheme-based findings, there were no noticeable differences in the school setting between games created with the different toolset versions, but in the workshop setting there were indications of difference between the games created with and without Narrative Threads. Overall there was more of a tendency for the Basic Toolset games to fail to effectively convey to the player narrative elements which the designer had intended. In some cases, elements discussed during interviews were not conveyed at all in the game, whilst in another example, poor guidance meant that the expert rater missed out on one key conversation which put the whole narrative into context.

In the next chapter these findings are discussed in relation to the findings from other chapters. Key contributions and conclusions are presented and the broader implications are examined, including reflections on useful future work in the area.

7 Conclusions & Further Work

This thesis has explored how game creation can be used as an activity to improve writing skills for young people aged 11-15, and how representational support tools can increase the potential for this learning. A critical review of the literature on game-based learning, writing development research, narrative theory and the use of representations in educational software was conducted to inform the design of support tools for the activity. An extensive participatory design process, involving teachers and young people, built on the foundation established from existing theory. The design culminated in the creation of a suite of tools intended to support young people in narrative-based game creation and encourage the development of writing skills. Two naturalistic field studies explored the potential for narrative-based game creation to support this learning, as well as evaluating the benefits of the support tools.

In this chapter, the findings from across the thesis are examined in the context of the research questions set out in Chapter 1. The key contributions of the thesis are then considered, followed by some areas of interest which could be usefully investigated in future work.

7.1 Research Questions

The research questions posed in Chapter 1 were revisited during the discussion of the evaluative studies. These detailed discussions are now synthesised and reflected upon to give summary answers to the questions based on the completed research.

RQ1 Are writing skills demonstrated in the narrative-based games created by young people? If so, which skills are demonstrated, and how is writing used in conjunction with other representational modes?

In Chapter 3, a number of curriculum-linked writing skills were identified by teachers as potential areas which game creation could help to develop. The in-depth analysis presented in Chapter 6 allowed investigation of the skills demonstrated in games created by young people, and a range of writing skills were in evidence in all of the mid and higher rated games, as well as in some of lowest rated games. Through their implementation of game-narratives, young people demonstrated traditional as well as multimodal and interactive writing skills. Composition skills, in the context of imaginative writing, was a key potential skills development area highlighted by teachers, and effective use of written language (including techniques such as writing speech in dialect which reflects the speaker's background) was clearly demonstrated in the most successful games. Most of the key narrative elements identified in games involved

considerable amounts of text, either as the central mode or as reinforcement for elements conveyed through other modes. Furthermore, there was evidence of skills in structuring a narrative in most games, which was another area emphasised by teachers. The use of text to structure and convey narrative elements was prevalent, but some of the most successful examples of narrative portrayal involved the use of text in conjunction with other representational modes. Skills in using writing effectively with other modes are not so clearly tied to existing curriculum areas, but the multimodal theory examined in Chapter 2 indicated that they will be increasingly important for effective communication. The teachers also commented on skills involved in writing to inform and writing to persuade, particularly considering what the reader (player) needs to know, and anticipating reader (player) reaction. These skills were demonstrated very convincingly through the player guidance implemented in many of the games. The planning and drafting skills highlighted by teachers, including the ability to critically analyse one's own and others' work, were also seen in process through the observations presented in Chapter 5, as well as in the finished games. Finally, evidence from across the studies showed how game creation can be used to inspire or build on related writing tasks, which have potential to support the practice of a wider range of writing skills.

RQ2 Does narrative-based game creation lead to any measurable improvement in general writing ability?

Chapter 5 presented evidence that game creation can lead to an improvement in general writing skills. In the school study, both game-making groups showed significant improvement in their writing levels, whilst two comparable classes did not show significant improvement over the same period. There is another possible interpretation of this result, which could link it to the two sets of classes having different teachers. However, the finding suggests that it would be beneficial to explore this issue further in future work, as discussed in Section 7.3.3.

RQ3 What features are desirable in a tool designed to support the use of writing skills in game creation, and improvement of writing skills more broadly?

By synthesising existing theory on the use of representations in educational software and conducting an extensive participatory design process involving teachers and target users, the desirable features of such a tool were established in Chapter 3. The identified features were implemented in Narrative Threads, a suite of tools described fully in Chapter 4.

At the highest level, it was determined that the tool should direct users' attention and effort to the tasks most relevant to the development of their writing skills. A key consideration was that reflective cognition should be encouraged for narrative creation

tasks, such as the planning and structuring of the plot and the development of characters and other key story existents. Input from teachers and target users highlighted the importance of linking effort to clear in-game outcomes to encourage the use of tools. The significance of this was further demonstrated through the usage of the tools as documented through system logs, participant interviews and researcher observations. These showed that the character creator, which embodied this principle most fully, was by far the most widely used tool as discussed further under RQ4 below.

RQ4 How is this additional interface support used by young designers over the course of a game creation project? Does the additional support change the way the toolset is used, and is there any motivational cost from the tool?

The additional interface support provided by Narrative Threads included character and object creator tools, a panel displaying story elements created with the tools which facilitated the addition of the elements to a game area, a branching narrative diagram and a story icons augmented map view. The investigation of tool usage in Chapter 5 indicated that the character creator tool was well-used in both settings, accounting for the highest time spent using Narrative Threads by a considerable margin. In both settings the second most frequently performed activity was the addition of important game elements to the game world using the story elements panel. The branching narrative diagram tool had the next highest usage in terms of time in both the school and the workshop, although there were few cases of users returning again and again to the tool. The remaining creator tools were used little, if at all, and most participants preferred to add other objects to their game using the built-in blueprints.

There was some evidence from the module statistics examined in Chapter 5 that Narrative Threads may have changed the way that the toolset was used. Considering these results in light of the in-depth analyses described in Chapter 6, the findings that Basic Toolset users created significantly more characters and placeable effects in the school setting and significantly more areas in the workshop setting do not seem to match with any important differences in the quality of the games. However, the significantly higher word count found in Narrative Threads workshop games triangulates with the finding that text was used most effectively by this group across all narrative elements. The finding that significantly more conditional elements were added to conversations by the Narrative Threads group in the workshop suggests a need for further research, as this could indicate an interesting association between scripting and narrative elements. This is discussed further in Section 7.3.5.

There are some indications that Narrative Threads could have affected motivation levels in the school setting. There was a slightly lower level of positive responses in relation to a question about enjoyment of the project in the group using Narrative Threads. However, there was no significant difference. Furthermore, there were timetabling factors which made it more likely that pupils with low levels of motivation would not have filled in the survey in the Basic Toolset class, whilst all pupils who were not absent filled in the survey in the NT toolset class. Additionally, no differences in motivation were observed during the workshop study, with both groups remaining equally enthusiastic throughout the week and all participants being eager to return early from lunch every day.

RQ5 Are there noticeable differences between the games created with the additional interface support and those created without this support? If so, how do these games differ, and is there a difference in the writing skills demonstrated in the games?

Chapter 5 revealed some quantitative differences in the game modules with a view to examining how toolset usage was affected, as discussed above. Chapter 6 examined the games created in much greater depth. A scheme-based analysis allowed an analysis of the quality of all 67 games from across both evaluative field study settings. In the school setting there was a slight trend for games created by the group who did not have the additional representational support to score more highly on some sub-categories, although this was not found to be significant. In the workshop setting, the scores overall were considerably higher than in the school setting, with the median score for both groups being over twice the median scores from the school games. Additionally, the Narrative Threads games were rated significantly more highly overall, and also on the sub-categories of *Visual Interest* and *Challenge*. The difference in findings between settings may be due to a floor effect, given the comparatively small amount of time spent on the game creation project in the school setting. It may also be that the time participants spent learning to use the new tools could have detracted from the quality of their games when time was very limited. The Basic Toolset group had fewer demonstrations and fewer new interfaces to learn, and this would have effectively given them more time to work on their games. When the total time spent on the project was 7.5 hours there is a chance this made a real difference, whilst it may have evened out over the 21 hours of the workshop setting.

A multimodal analysis allowed a more targeted analysis of a subset of games across the two settings, with a focus on specific game features and the skills demonstrated through them. Again, the most striking difference was between the two settings, with the school games having considerably fewer examples of effective portrayal of narrative elements. Written text was a key transmitter of meaning across all games, and those which had little text also had little narrative coherence. However, there were some skilful examples of

other representational modes being used in combination with text to great effect, and the Narrative Threads workshop group had noticeably more examples of this, as well as higher usage of text overall. This indicates that the Narrative Threads group demonstrated a greater level of writing skills through their games in the workshop setting.

RQ6 Does the additional representational support in Narrative Threads lead to any greater improvement in writing ability?

Chapter 5 explored this question through the writing ability data gathered in the school and workshop studies. The school study results showed that, although there was a trend for Narrative Threads users to show greater improvement in general writing ability in comparison with users of the Basic Toolset, the difference was not statistically significant.

The workshop study examined writing ability on a task closely related to the game creation project. Participants who had used Narrative Threads wrote significantly more, and were marked significantly more highly on a multimodal writing task completed at the end of the game creation project than participants using the basic version of the toolset. As there was no significant difference in marks or word counts between the groups on a multimodal writing task undertaken at the beginning of the workshop, this suggested that Narrative Threads had a positive effect on writing ability, as demonstrated in the given task. This finding could be linked to the greater reflection on narrative elements which Narrative Threads aimed to encourage, and may be a temporary result of these participants having put more thought into these aspects of their games prior to the task. To explore whether this difference is transferable and would persist over time, further work would be required.

RQ7 How can the broader activity context support game creation? How does it affect the usage of the additional support, the skills demonstrated in the games created, and any improvement in writing ability?

This question has been considered in a number of chapters of the thesis. The design studies described in Chapter 4 allowed examination of the first part of this question through four game creation projects which took place within different contexts. An initial exploration of the importance of the broader context, through observations made during these studies, highlighted the importance of introducing functionality to participants a little at a time, and allowing them reasonably free rein to explore the potential of the tool. There was also good indication that linking the game creation task with related writing activities (such as a short story set in the game world or the game box packaging) can be positive. Supporting activities such as story planning were considered to be important by teachers and workshop leaders, but some participants found them to be unmotivating and

did not see them as a key part of the game creation activity but rather as something to be skipped over as quickly as possible to allow them to get to work with the toolset.

Room layout and the classroom/workshop culture had a noticeable effect on the level of collaboration, ideas sharing and helping behaviour between participants. Participants were more likely to engage in this behaviour with those close enough to speak to, particularly where classroom culture encouraged pupils not to leave their seats.

The evaluative studies presented in Chapter 5 and Chapter 6 allowed investigation of the second part of the question. In the design of these studies the aim was to include some of the beneficial contextual and supporting elements identified in the design studies. In the school setting, a link with the pupils' English class work was intended to promote narrative elements in games across both groups. However, once the project was underway the teacher did not feel able to give up time during English lessons to strengthen this link, and less than half of pupils reported using ideas from their English work on myths within their games. Interestingly, in the NT toolset group 48% of pupils reported using ideas from their myths, whilst only 30% of users in the basic toolset group said the same. This trend suggests that it may be worth investigating whether Narrative Threads has potential to strengthen links with supporting activities. It was not possible to alter the physical setting of the classroom to better support collaboration, and given the behavioural problems experienced with both classes, the teacher was understandably reluctant to encourage pupils to move around the classroom freely. In both workshop settings participants were seated close together, and smaller groups in a more informal setting allowed collaboration and helping behaviours to flourish.

When considering the differing outcomes of the projects in both settings, it is clear that the workshop context provided the most support for the activity. The restricted time and structure of classroom settings can be problematic as the skills needed to create these games are complex, and considerable time is needed to get the most out of the activity. The additional time on the project was undoubtedly important, but given that school participants were observed to forget things they had learnt between lessons, there was also evidence that the intensity and frequency of the sessions was important. Giving pupils twice the length of time to work on the project with the lessons still spread out in the same way would have been unlikely to have improved the outcomes to the level of the workshop setting. The ratio of helpers to participants was also better in the workshop settings, and the self-selecting nature of workshop attendees will undoubtedly have further contributed to the difference. Nonetheless, considering the supportive features of these settings and looking for ways to bring the classroom context more in line with these is potentially productive. The classroom setting examined in Design Study 1 had more in

common with workshop settings than the other school contexts, having more intense time on the project thanks to a cross-curricular approach, and a collaborative atmosphere encouraged via the class blog. Investigation of whether the support provided in a classroom setting such as this translates to better learning outcomes and higher quality games would be a fruitful area for future research, as discussed in 7.3.1.

7.2 Contributions

The main contributions of this thesis, which have wider applicability beyond the specific focus of this research, are described in the following sub-sections.

7.2.1 A suite of tools that provide support for the creation of narrative-based games

A participatory design process, based on a foundation of existing theory, led to the creation of a suite of tools that are usable by young people aged 11-15 and have been shown to improve some narrative-related elements of game creation, given the right setting. Evidence presented in Chapters 5 & 6 indicated that use of the tools potentially leads to higher quality games which demonstrate more advanced writing skills, and better performance on related writing tasks.

The benefits of the tools were most clear when the context was supportive of the activity. There was no measureable difference between the quality of the games created with and without Narrative Threads in the school setting, in either the scheme-based or multimodal analysis. There was a trend for pupils using Narrative Threads to show greater improvement in writing ability, but this was not found to be statistically significant. In the workshop setting there was evidence from the scheme-based and multimodal analyses that the games created using Narrative Threads were of higher quality, and the performance of pupils on a related writing task was also significantly higher.

7.2.2 A rating scheme for use by educators and researchers in assessing narrative-based games

The narrative-based games created by young people are complex artefacts and assessment is not straightforward. Assessing games created for quality is important, both for teachers using the activity as a school project, and for researchers investigating the benefits of the activity and evaluating different tools and approaches. Playing through a number of games can be very time consuming, and with no scheme to refer to, it can be a challenge to mark games consistently, even for experienced teachers. Thus, teachers and researchers are faced with the challenge of finding a convenient and accurate way of assessing the overall quality of a game. In the projects observed during the design studies, teachers and researchers tackled this issue in one of a number of ways. One teacher set additional tasks for pupils around the game creation project (such as written pieces and art projects) and used these as the primary evidence on which marks

were given, another used a simplistic metric (counting the conversations, areas and quests within games). Researchers involved in these projects either focussed in on a small subset of the games and resigned themselves to spending considerable time assessing these, or focussed on other data sources such as observations and interviews with participants. Each of these approaches involves a sacrifice of time, consistency or subtlety of assessment.

In this thesis, a full game-rating scheme, which provides a structure to support an efficient and consistent approach to marking narrative-based games, was presented. The scheme has been used successfully with two sets of games (67 games in total) within this thesis, and has subsequently also been used by another researcher who examined gender differences in a set of 25 narrative-based games (Robertson 2012).

7.2.3 A multimodal analysis of a set of narrative-based computer games

Computer games are difficult to analyse following currently established multimodal analysis techniques. There are few examples of multimodal analyses of games, all of which involve single or very small sets of games. Leander and Vasudevan (2009) analyse a single episode of game play by a young person with a particular focus on the coordination between mapped and embodied spaces. Burn's (2007) analysis of two games created by young people considers the games as examples of multimodal literacy, although it is not explicitly proposed as a multimodal analysis and the methodology is not described. Lemke (2009) speaks generally about multimodality, identity and time in games and transmedia franchises, but does not provide an analysis of specific games.

The multimodal analysis of 12 games conducted for this thesis and presented in Chapter 6 makes a contribution to the existing work in the area by examining a larger set of games than previous work has done.

7.2.4 Evidence that young people can develop writing skills through game creation

The games created by young people were examined in detail to determine the skills evidenced through the task. The range of skills used indicate that game creation is a viable and promising activity. Multimodal writing skills involving the use of textual, visual and action modes to convey narrative elements were evident in many of the games created. Audience awareness was also a crucial skill the young designers had to develop. Being able to put oneself in the player's shoes was essential, as carefully written conversations could be (and were in some cases) missed due to poor guidance.

Where more traditional writing skills are the focus, there is also potential for game creation to act as a spur for related writing activities, such as the short stories produced in one of the school settings, and the game box descriptions written in two of the workshop contexts. However, there was also considerable evidence that creating a successful narrative game which a player is able to make sense of requires considerable use of traditional writing skills in its own right.

7.2.5 Evidence about the relative effectiveness of different contexts in supporting writing development through narrative-based game creation

Across six game creation projects, a number of different approaches to supporting writing development were observed. The evaluation studies showed that the learning context is hugely important to the success of game creation projects, as well as learning outcomes. Across all of the studies, the school settings were the most challenging in which to actualise the potential of the game creation activities. The major barriers were restricted overall time for the project and dispersed sessions which led to participants forgetting things they had already learnt. In one of the school settings a cross-curricular project-based approach allowed more intensive periods of time working on the project with support from related activities. This approach has promise, and could be a good model for future work aiming to implement game creation projects within a school setting.

Motivation was found to be a very important factor, and it is clear that in a classroom setting not all pupils will be enthused by a game creation project of this sort. The workshop participants were generally more highly motivated, which is likely to have contributed to the better outcomes in this setting. In school settings the fact that the activity is not voluntary may have had an effect in itself, but there are likely to be pupils to whom the creation of games of this or any type may not appeal.

Successfully integrating the activity with related supporting and extending tasks is also important when considering the success of the implementation in schools. There was some indication across the evaluative studies that Narrative Threads could be helpful in the integration of related writing activities. In the school there was a trend for pupils using the NT toolset to integrate their games more with their English work, as measured through their survey response to the question about using ideas from their myths. In the workshop setting, pupils put more effort into the end of workshop writing task (creating a box cover for their games) and the work was rated significantly more highly. This suggests that support tools such as Narrative Threads could have a further role to play in curriculum integration.

7.3 Future Work

This thesis has suggested some potentially fruitful areas for further research, a selection of which are discussed below.

7.3.1 Design and investigate school-based learning contexts which provide more support for narrative-based game creation

This research has presented evidence that the context and supporting activities around a game creation project are crucial to its success. In this thesis, the best outcomes have been achieved in workshop settings, where motivated young people voluntarily take part in game creation projects, have extended time available to work on their games, can collaborate freely with peers and have support from experienced facilitators who can help them to get the most out of the toolset. For narrative-based game creation to be of value to a wider range of young people, integration into school settings is desirable. There are potential ways in which curriculum structure and content could be updated to better support such activities, and evidence from successful school-based projects which show the benefits of these activities is essential for making the case for such changes.

It would be valuable for future work to explore further how contextual elements identified as being supportive can be included in school settings. Cross-curricular links are an important area to investigate, as they raise the potential for more intensive time to be spent on the project. A partially successful collaboration with an English teacher in the evaluative school study demonstrated that teachers need to be sure of the benefits of an activity before being able to commit class time to it. This would be an important factor to consider in achieving success with cross-curricular projects, and one way of encouraging teacher buy-in is discussed in the following sub-section. Other aspects for consideration include giving pupils as much control and choice as possible within the project to encourage their buy-in, and finding novel ways to support collaboration and the sharing of ideas within the constraints of a large-class setting.

7.3.2 Pursue teacher-led implementations of game creation projects

In this research, all but one of the game-creation projects were run by researchers, with them providing the demonstrations and introductions to the tools, as well as full support for queries and on-the-spot help. In one of the design studies, an enthusiastic teacher who received training from researchers was able to take on some of the day-to-day running of the project herself, although the demonstrations were still given by researchers. There is evidence that providing teachers with full training in innovative software tools can help with integration into the curriculum and teacher buy-in, as well as increasing the naturalism of evaluative research studies and encouraging skills-sharing between teachers (Robertson, MacVean and Howland 2012). Using the approach proposed by Robertson et al., the Train the Teacher Model (TTM), could provide teachers with the skills and confidence to lead game creation projects themselves.

In addition to the benefit of a more realistic evaluation mentioned above, it could also draw on the teachers' pedagogical and curriculum integration expertise.

7.3.3 Further investigation of the potential improvement in writing ability

Future studies, taking account of the study design considerations suggested above, should further investigate the finding about improvement in writing ability after taking part in the game creation project. In the school study, both game-making groups showed significant improvement in their writing levels. Whilst two comparable classes served as control groups, and this improvement was not evident in these classes, there are other possible explanations for the result. Given the potential importance of this finding, further studies should examine whether it is repeatable.

7.3.4 Explore ways of improving the design of Narrative Threads

Although Narrative Threads was found to be usable and to improve the quality of narrative-based games and performance on related writing tasks, given the right setting, there were areas for improvement revealed through the evaluative field studies. The character creator was by far the most well-used tool, and the branching narrative diagram was not returned to by many participants after the initial use, as was hoped. One approach to tackling this issue would be to apply the principle of tying effort to clear in-game outcomes more fully in other tools. This was done wherever it was deemed possible in the design of Narrative Threads, based on the input of teachers and target users, but in tools such as the branching narrative diagram it was particularly hard to implement. Given the usage results, it would be useful to revisit the design of the tool and to look for more possibilities for carrying through this principle here. If activities carried out within the diagram had noticeable and useful outcomes within the game, then there is evidence that participants would be more likely to return to the diagram. For example, in a future design, drawing connections between scenes in the diagram could potentially create transitions between relevant areas, or create scripts to reflect the behaviours indicated by the diagram.

7.3.5 Explore the link between scripting and narrative

An unexpected finding of this research was that participants using Narrative Threads in the workshop setting had a significantly higher number of conditional scripts attached to conversations. This finding might be linked to the fact that the participants in this group also wrote significantly more words in their conversations than those without the additional support, and perhaps put more effort into all aspects of conversations. However, there is also emerging evidence from related research, conducted as part of the Flip project, that teachers using this visual scripting language with their classes believed that scripts were very often used for

narrative purposes with pupil's games (Good and Howland 2012). For this reason it would be a fruitful to explore the link between scripting and narrative elements further.

7.4 Closing Remarks

This thesis has demonstrated that game creation has strong potential for supporting writing skills development, but the context of the activity, as well as the software tools provided, must be conducive for the potential to be realised. In order to get the most from the activity in a school setting, it is important to look for ways of supporting more intensive engagement with the project.

New curricular approaches have potential to provide a better foundation for an activity such as this. The Scottish Curriculum for Excellence 3-18 (Scottish Executive 2004), which was introduced across Scotland in August 2010, takes a topic-based cross-curricular approach to teaching and learning, and also encourages more pupil choice about the focus of activities. Similarly, the International Middle Years Curriculum which is being taken on by some of the new British academies (Fieldwork Education n.d.) promotes a theme-based cross-curricular approach with the aim of helping pupils draw connections which demonstrate the relevance of their learning to their everyday lives. Under these and similar curricular approaches, there is potential for game creation projects such as those presented here to thrive.

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Appendix A.1: Consent Forms for Design Studies

'Flip' Design Sessions – Game Making Project

The following document is designed to give you more information about the Flip project, which you are invited to read before completing and signing the attached consent form.

Background

This term your child will be taking part in a game making project during their ICT lessons. This project is being carried out in collaboration with a research project at the University of Sussex, Flip, which is funded by the UK Engineering and Physical Sciences Research Council (EPSRC). Flip is looking at how children can learn to use some important programming concepts through creating their own computer games. We are working with teachers and learners to develop a specialist programming language which will help young people to develop these skills. In addition, a DPhil (PhD) project at the university is looking at how writing skills can be improved through game creation, and will involve the design of software tools to support this.

Research Activities

In these sessions we will be teaching pupils how to create their own computer game using existing software. We will then be enlisting their help with the design of additional programs to improve this software. We will observe them working with the existing software in order to find out how difficult/easy it is to use, and whether or not it helps their learning. Design activities include things like pupils drawing new interfaces for the software, and testing software that we have developed, as well as answering questions about their experiences with the software and their understanding of different parts of the game creation process.

Data recording

As part of the research we would like to understand what happened in a situation, how the technology was used and how people interacted with it. To do this we will observe the participants during the classes. We will also conduct informal interviews with them directly about their perceptions and opinions of the experience. Ideally, and where consent is given, observation and interviews will be video or audio taped. We will also take hand written notes. After the event, we will transcribe the videos and notes, whilst maintaining all participants' anonymity. Transcripts are used for our own data analysis. Use of recorded material will be strictly limited in accordance with the consent given by you on the consent form.

The Researchers

The researchers involved with this study are Dr. [REDACTED], Katy Howland and [REDACTED], who are all researchers at Sussex University. All of the researchers involved in the study have been cleared by the Criminal Review Board (CRB) to ensure that there is no objection to them working with children or other vulnerable persons.

Privacy and Anonymity

The names of participants will not be reported in any articles or other documents generated from this observational study. All data will be held in accordance with the Data Protection Act and will not be used for any purpose for which it is not expressly permitted.

Participation

Please note that you (and the person you are giving parental/guardian consent for) are free to participate in this study or not. You (and they) can withdraw their participation at any time without penalty. You can ask questions about the conduct of the study at any time. You (and they) can decline to answer any questions you do not wish to answer. You (and they) can ask for any video or digital images to be deleted or not to be used in any way.

Questions of Concern

Dr. [REDACTED] is the Principal Investigator on the Flip project at Sussex University and is in charge of this research. If you have any questions, concerns or complaints about the study or the way it is conducted, please feel free to contact Dr. [REDACTED] on ([REDACTED]) [REDACTED] or via email on [REDACTED].

Flip Project Consent – Parents and Guardians

We'd like your permission to use some of your child's information in the research project. Please note that we will also ask your child the same questions. If either you or your child does not wish the information to be stored or used, we will not do so.

Your child's name will never be connected to the research results or released to anyone outside the project; a pseudonym will be used for identification purposes. Information that would make it possible to identify any participant will never be included in any sort of report, or disclosed outside the project, unless explicit permission has been given for use.

Child's name: _____

Child's age: _____

- Is it OK for us to keep a copy of your child's work on the project?
☐ Yes ☐ No ☐ Let my child decide
- Is it OK for us to keep audio tapes of interviews with your child to remind us what he or she said?
☐ Yes ☐ No ☐ Let my child decide
- Is it OK for us to keep video tapes of interviews with your child to remind us what he or she said?
☐ Yes ☐ No ☐ Let my child decide
- Sometimes we write articles or give presentations about games and learning to teachers and other people interested in education. Is it OK to include your child's comments when we do this?
☐ Yes ☐ No ☐ Let my child decide
- Sometimes we write articles or give presentations about games and learning to teachers and other people interested in education. Is it OK to include pictures of your child when we do this?
☐ Yes ☐ No ☐ Let my child decide
- Sometimes we write articles or give presentations about games and learning to teachers and other people interested in education. Is it OK to include videos of your child when we do this?
☐ Yes ☐ No ☐ Let my child decide
- Sometimes information about the project may be published on the web or in print or broadcast media. Is it ok to include pictures of your child in these cases?
☐ Yes ☐ No ☐ Let my child decide
- Sometimes information about the project may be published on the web or in print or broadcast media. Is it ok to include videos of your child in these cases?
☐ Yes ☐ No ☐ Let my child decide

Signed: _____

Full Name: _____

Date: _____

Thank you. Please return this form to the class teacher as soon as possible.

Flip Project Consent – Pupils

We hope that you enjoy making games with us as part of the Flip research project. We'd like your permission to use some of your information in the research project. During the project we will ask you some questions about what you think of making games, and what you find easy or difficult about using the software. The answers you share with us will help us to make the software better for other children to use in the future.

Your name will never be connected to the research results or released to anyone outside the project; a pseudonym (fake name) will be used. Information that would make it possible to identify you will never be included in any sort of report, or disclosed outside the project, unless explicit permission has been given for use.

Your name: _____

Your age: _____

- Is it OK for us to keep a copy of your work on the project?
☐ Yes ☐ No
- Is it OK for us to keep audio tapes of interviews with you to remind us of what you said?
☐ Yes ☐ No
- Is it OK for us to keep video tapes of interviews with you to remind us what you said?
☐ Yes ☐ No
- Sometimes we write articles or give presentations about games and learning to teachers and other people interested in education. Is it OK to include your comments when we do this?
☐ Yes ☐ No
- Sometimes we write articles or give presentations about games and learning to teachers and other people interested in education. Is it OK to include pictures of you when we do this?
☐ Yes ☐ No
- Sometimes we write articles or give presentations about games and learning to teachers and other people interested in education. Is it OK to include videos of you when we do this?
☐ Yes ☐ No
- Sometimes information about the project may be published on the web or in print or broadcast media. Is it ok to include pictures of you in these cases?
☐ Yes ☐ No
- Sometimes information about the project may be published on the web or in print or broadcast media. Is it ok to include videos of you in these cases?
☐ Yes ☐ No

Signed: _____

Date: _____

Thank you. Please return this form to your teacher as soon as possible.

Gamemaker Workshop

August 3 – 7, 2009



Consent Form

The Gamemaker Workshop is part of the Flip research project, funded by the Engineering and Physical Sciences Research Council (EPSRC), a governmental funding body. The aim of the Flip project is to design a programming language which will make it easier for young people to create computer games while at the same time helping them to learn more about programming, hopefully in a fun way!

We would like to involve young people in the design of the programming language from the start, and carry out some design activities during the Gamemaker Workshop. This might involve them working with the existing software and telling us how difficult/easy it is to use. We might also ask them to test software that we have developed, as well as answering questions about their experiences with the software. When young people take part in these activities, we collect data that we can use at a later stage to inform our designs (this data can take the form of audio recordings of discussions/ interviews with your child so we can keep a record of their opinions, or video footage of them trying out some new software). In our experience, young people very much enjoy these activities and it allows them to contribute to the development of a real product.

By taking part in the Gamemaker Workshop, and signing below, you (and your child) are agreeing that your child can take part in these activities, and that we can use the data collected within the project to help us with our language design. Any data collected will be anonymised, and will not allow your child to be identified in any way.

In addition, we sometimes write articles or give presentations on our research. With reference to the use of photographic or video data for these occasions, please tick one of the following boxes:

- ☐ I AGREE that my child's likeness (e.g. on videotape) can be used for articles and presentations.
- ☐ I DO NOT AGREE that my child's likeness (e.g. on videotape) can be used for articles and presentations.

If you have any questions whatsoever, please do not hesitate to contact Dr. [REDACTED], the Principal Investigator on the Flip project, by email: [REDACTED] or by telephone: ([REDACTED]) [REDACTED].

Parent/carer name: _____

Signed: _____

Child name: _____

Signed: _____

Date: _____

Thank you.

Appendix A.2: Semi-structured Interview Guide – Teacher Interviews

Theme	Questions
<i>Background</i>	Can you tell me briefly about your background and your current role?
<i>Curriculum</i>	<p>There's been a lot of change in curriculum in Scotland recently. Can you tell me what you think are the main differences between the 5-14 programme and the new curriculum for excellence?</p> <p><i>(Only ask teachers working in Scottish schools)</i></p> <p>How about specifically for English language and literacy?</p> <p><i>(Only ask teachers working in Scottish schools)</i></p> <p>Are there any areas of the national curriculum which children of this age have particular difficulty with?</p> <p>How does the National Literacy Strategy (now National Strategy: Framework for teaching English: Years 7, 8 and 9) influence your teaching? Are there any areas of the strategy which are more difficult to meet than others?</p> <p><i>(Only ask teachers working in English schools)</i></p>
<i>I'd like to ask you quite generally at first about issues in English teaching and learning. I'm particularly interested in the 11-14 age range, so that's <P7-S2 (Scotland)/ Years 7-9 (UK)>.</i>	
<i>Motivation</i>	<p>What sort of activities do children of this age find motivating? Are there any activities which they don't find motivating?</p> <p>Is it important that children of this age are motivated? How does it affect their learning if they're not motivated? What is the effect on their learning if they are motivated?</p>
<i>Creative Writing</i>	<p>Do you do many creative writing activities with your 11-14 pupils?</p> <p>What are the benefits of creative writing activities?</p> <p>Do pupils find creative writing activities motivating?</p> <p>What skills can be developed through creative writing activities?</p> <p>Is creative writing a viable activity for teaching skills other than those in the imaginative writing strand?</p> <p>Do you teach children about the narrative structure of stories?</p>

<i>External representations</i>	<p>Do you ever ask children to use diagrams or other external representations to support writing tasks?</p> <p>If, so which representations do you use? And how have you used them and in which activities?</p>
<i>ICT in English</i>	<p>Before this project had you used ICT in other ways to support the development of English skills?</p> <p><i>(Only ask teachers already involved in game creation projects)</i></p> <p>Do you use ICT in any of your English lessons?</p> <p>If so, tell me about the activities which use ICT?</p> <p>Why did you choose to make use of ICT in each of these activities?</p> <p><i>(Only ask teachers not already involved in game creation projects)</i></p> <p>Do you think use of ICT should be included in the curriculum for English? If so, in what ways?</p> <p>Do you think ICT has the power to enhance learning in English? If so, how?</p>
<i>Relation of Media to English</i>	<p>Do you think that the study of different medias such as films and computer games have a place in English at this level?</p>
<i>Experience with games</i>	<p>Have you played on a computer game in the last year?</p> <p>If so, what sort of games have you played?</p> <p>How often do you play these games?</p> <p>Are you familiar with the idea of interactive stories?</p> <p>If so, do you think writing interactive stories has any benefits over writing linear stories?</p>
<i>Careers which use English</i>	<p>A good grasp of English is clearly important for most careers, but which are the careers which you think have the greatest requirement for English skills?</p> <p>Do you ever talk about possible careers to motivate pupils in English classes?</p>
<p><i>Demonstrate the toolset and some student games created using the toolset.</i></p> <p><i>Questions following demo:</i></p> <p><i>(Only for teachers without experience of the toolset)</i></p>	

<p><i>Opinions on game creation as a task which can develop writing skills</i></p>	<p>Do you think that game creation has potential as an educational activity?</p> <p>If so, please explain how.</p> <p>Are there any motivational benefits?</p> <p>Are there any pedagogical benefits?</p>
<p><i>We've spoke more broadly about potential benefits that game creation could have, but I'm particular interested in whether there's a potential to develop writing skills.</i></p>	
<p><i>Writing specific benefits</i></p>	<p>Do you think game creation has the potential to help develop writing skills?</p> <p>How does writing a traditional story compare to writing a game?</p> <p>With reference to curriculum programmes:</p> <ul style="list-style-type: none"> • What sorts of writing skills could be developed using the NWN2 toolset? • Are there other writing skills which could be developed if the tool was altered? <p>What sorts of changes would help?</p>

Appendix A.3: Pupil Consultation Questionnaire – Design Study 1

About making games

Are you enjoying making your own game?

☐ Yes, because _____

☐ No, because _____

What do you find hard about making your game?

Are you getting better at making games?

☐ Yes

☐ No

If yes, what things are you getting better at?

Is making games helping you get better at other things you do in school?

☐ Yes

☐ No

If yes, what things are you getting better at?

About writing stories

Do you enjoy writing stories?

☐ Yes, because _____

☐ No, because _____

What do you find hard about writing stories?

What things do you learn from writing stories?

Appendix A.4: Interview/ Activity Guide – Design Study 2

Questions for demonstration of game through toolset

1. Talk me through your story – including the choices the player must make

Watch for:

- Whether they point to locations on the map to explain their story
- Does every aspect of the story have a ‘location’?
- Ask “how does the player know that”, or “how do you communicate that to the player” if it’s not obvious
- Ask:

Where are there conversations?

Where are there important characters?

Where are important placeables?

Where are there important items?

Where are transitions to other levels?

2. How do the following help you tell your story?

- Conversations
- Area design
- Characters
- Items
- Events

(When do you use these?)

(Why did you choose to tell the player that way?)

3. Show me where the important bits in your story happen

Prototype Testing Activity – using acetate over laptop screen task

Ask participants to use the acetate and pens to mark on important story points in a given area. I.e. get them to augment the on screen representation of their area with richer information about the important story elements shown.

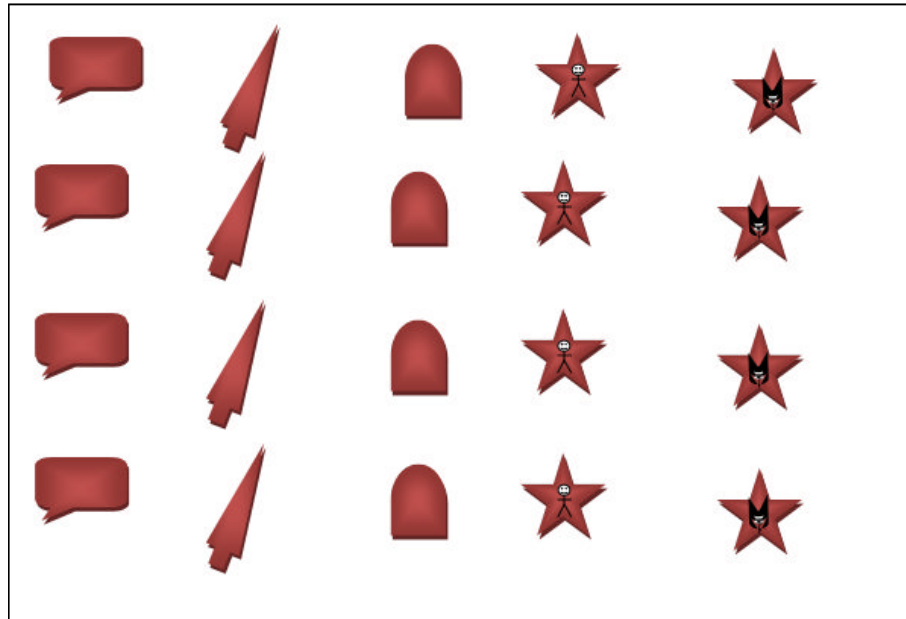


Figure A.4.1: Icons used in prototype testing activity

Appendix A.5: Icon Design Materials – Design Study 3



Key

 Conversation

Important character

Fight/ battle

Important item

Area transition

Appendix A.6: Game Packaging Template – Design Study 4

About Your Game

What is the back-story to your game, and where is it set? Write about the world the game takes place in, what the player's goal is in the game, the adventures they can have, and the characters they will meet along the way. Give them a summary of the things they will encounter, but you might not want to give away the ending just yet! This is your chance to entice potential players to try your game and find out how the story ends! You could also use a screen shot to illustrate your text if you like.



Special Features/ Highlights

This is your chance to show off some of the things you are most proud about in your game! You could include some information about your most interesting characters and perhaps include some screen shots of them.



You could also include some information about and images of important items in the game, or areas which are particularly beautiful, scary or exciting, or you could talk about key quests or battles which the player can take part in.

GAME TITLE By Game Designer

Game Title
By Game Designer



'A magical tale of darkness and light, the slow death of a forest and the fight to save it from destruction!' (Put a few lines here which give people an idea what to expect from your game)

Appendix A.7: Mini-Interview Question Guide– Design Study 4

- What was the bit you like most about making games?
- Were there bits that you found hard, or that you didn't like as much?
- (If not mentioned already) What about your game box. Did you enjoy making that?
- Did you find it easy, or hard to make your game box?

Appendix B.1: Consent Forms for Evaluative Field Studies



Consent Form

Dear Parent or Guardian,

This term your child will be taking part in a game making project during their ICT lessons. We ran this project with three year 7 classes last year and found that pupils really enjoyed creating their own games and learnt a lot about the skills required to make computer games. This year they will create 3D role-playing games inspired by the work on myths they have been doing in their English lessons.

The project is being carried out at [redacted] in collaboration with Flip, a research project at the University of Sussex, funded by the Engineering and Physical Sciences Research Council (EPSRC), a governmental funding body. The aim of the Flip project is to design a programming language which will make it easier for young people to create computer games and help them to learn more about programming in a motivating way. In addition, a DPhil (PhD) project at the university is looking at designing software to support the improvement of writing skills through game creation.

In order to evaluate the software we have created and understand how it can be improved we would like to record some information about pupils' experiences with it. This will involve keeping a copy of the work they do, and may include us making audio recordings of interviews with pupils, or making video recordings and taking photographs of the software being used. Any data collected will be anonymised, and will not allow your child to be identified. Below we request permission to keep this data to help with our evaluation, and make use of your child's likeness in academic articles or conference presentations. Please return the cut of portion of the form indicating whether or not you agree to these requests.

If you have any questions whatsoever, please do not hesitate to contact Dr. [redacted], the Principal Investigator on the Flip project, by email: [redacted] or by telephone: ([redacted]) [redacted].

Keeping a record of pupils' experiences with our software allows us to improve it for future work with schools. Please tick the following boxes if you agree to us keeping a copy of this data to help with our research:

- ☐ You may keep audio recordings of conversations or interviews with my child
- ☐ You may keep photos of the software being used by my child
- ☐ You may keep video recordings of the software being used by my child

We sometimes write articles or give presentations on our research. With reference to the use of audio, video, or photographic data for these occasions, please tick **one** of the following boxes:

- ☐ I AGREE that my child's likeness (e.g. on videotape) can be used for articles and presentations.
- ☐ I DO NOT AGREE that my child's likeness (e.g. on videotape) can be used for articles and presentations.

Child's name: _____
Child's age: _____

Signed: _____
Full name: _____
Date: _____

Thank you. Please return this form to the class teacher as soon as possible.

Gamemaker Workshop

October 25-28, 2010



Consent Form

The Gamemaker Workshop is part of the Flip research project, funded by the Engineering and Physical Sciences Research Council (EPSRC), a governmental funding body. The aim of the Flip project is to design a programming language which will make it easier for young people to create computer games while at the same time helping them to learn more about programming, hopefully in a fun way!

We have worked with young people on the design of Flip in previous workshops and, as a result, we are pleased to have an early release of the language ready to use at this workshop. During this workshop, we would like users to continue to help us improve the Flip language. This might involve us observing whether users have difficulties with Flip, or asking questions about their experiences. During this time, we may make audio recordings of discussions/ interviews with your child so we can keep a record of their opinions, or record video footage of them trying out the software). In our experience, young people very much enjoy these activities as it allows them to contribute to the development of a real product.

By taking part in the Gamemaker Workshop, and signing below, you (and your child) are agreeing that your child can take part in these activities, and that we can use the data collected within the project to help us with our language design. Any data collected will be anonymised, and will not allow your child to be identified in any way.

In addition, we sometimes write articles or give presentations on our research. **With reference to the use of photographic or video data for these occasions, please tick one of the following boxes:**

☐ **I AGREE that my child's likeness (e.g. on videotape) can be used for articles and presentations.**

☐ **I DO NOT AGREE that my child's likeness (e.g. on videotape) can be used for articles and presentations.**

If you have any questions whatsoever, please do not hesitate to contact Dr. [REDACTED], the Principal Investigator on the Flip project, by email: [REDACTED] or by telephone: ([REDACTED]) [REDACTED].

Parent/carer name: _____

Signed: _____

Child name: _____

Signed: _____

Date: _____

Thank you

Appendix B.2: Interview Guide Questions & Materials

School Study Interview Questions

1. Tell me about your game

(Ask everybody this and wait to see what they answer before any prompting)

2. What is the story of your game?

(Ask anyone who didn't talk about the story of their game in answering the previous question this and wait to see what they answer before any prompting)

Additional prompts to be used after they've gone quiet if they need them:

-Does the player have a goal in your game?

-What is the land like where the game is set?

3. Who are the main characters in your game?

(Wait to see what they say before continuing)

Prompt them to talk about the player if they haven't already done so, AND ask whether there are any other important characters.

For each character, X, discussed, start with:

3a. Ok, tell me about X

- if necessary prompt with additional questions below after they've run out of steam answering the above question

3b. What does X look like?

3c. What is X's personality like?

3d. What does X want? What is their goal in the game?

4. What challenges are there for the player in your game?

5. Did you manage to make things happen in your game using Flip? Did they happen like you expected?

6. How easy or hard did you find Flip to use?

7. (Show Flip screen shot)

7a. Can you tell me what this bit is for (point to natural language area)?

7b. Can you tell me what this bit is for (point to 'When' slot)?

Questions for Toolset NT Class only

8. (Show branching narrative view screen shot) Did you use the story diagram tool to plan your game?

8a. Did you find it useful?

8b. Did you find it easy or hard to use?

9. (Show character creator screen shot) Did you use the character creator tool?

9a. Did you find it useful?

9b. Which bits did you use the most?

9b. Did you find it easy or hard to use?

10. Did you use the other creator tools (item, door etc)?

10a. Did you find them useful?

10b. Did you find them easy or hard to use?

11. (Show screen shot of story icons showing) Did you turn on the story icon view on your map?

If so:

11a. Did you find it useful?

11b. Did you find them easy or hard to use?

Workshop Study Interview Questions

1. Tell me about your game

(Ask everybody this and wait to see what they answer before any prompting)

2. What is the story of your game?

(Ask anyone who didn't talk about the story of their game in answering the previous question this and wait to see what they answer before any prompting)

Additional prompts to be used after they've gone quiet, only if they need them:

-Does the player have a goal in your game?

-What is the land like where the game is set?

3. Who are the main characters in your game?

(Wait to see what they say before continuing)

Prompt them to talk about the player if they haven't already done so, AND ask whether there are any other important characters.

For each character, X, discussed, start with:

3a. Ok, tell me about X

- if necessary prompt with additional questions below after they've run out of steam answering the above question

3b. What does X look like?

3c. What is X's personality like?

3d. What does X want? What is their goal in the game?

4. What challenges are there for the player in your game?

5. Does the player have choices in your game?

If so:

5a. Do the choices affect how the story plays out?

6. Did you get any feedback from the playtesting exercise?

6a. What were the main suggestions?

6b. Did you make changes to your game based on the feedback?

7. Did you manage to make things happen in your game using Flip?

If so:

7a. Did they happen like you expected?

8. How easy or hard did you find Flip to use?

9. (Show Flip screen shot)

9a. Can you tell me what this bit is for (point to natural language area)?

9b. Can you tell me what this bit is for (point to 'When' slot)?

Questions for Toolset NT group only

10. (Show branching narrative view screen shot) Did you use the story diagram tool to plan your game?

If so:

10a. Did you find it useful?

10b. Did you find it easy or hard to use?

11. (Show character creator screen shot) Did you use the character creator tool?

If so:

11a. Did you find it useful?

11b. Which pages did you spend the most time on?

11b. Did you find it easy or hard to use?

12. Did you use the other creator tools (item, door etc)?

If so:

12a. Did you find them useful?

12b. Did you find them easy or hard to use?

13. (Show screen shot of story icons showing) Did you notice the story icons on your map?

If so:

13a. Did you find them useful?

13b. Did you turn them off sometimes? If so, why?

Appendix B.3: Assessing pupils' progress in English at Key Stage 3: Assessment guidelines¹

The National Strategies | Secondary
Assessing pupils' progress in English at Key Stage 3: Assessment guidelines

1

Writing assessment guidelines: levels 2 and 3

Name:

	AF5 – vary sentences for clarity, purpose and effect	AF6 – write with technical accuracy of syntax and punctuation in phrases, clauses and sentences	AF3 – organise and present whole texts effectively, sequencing and structuring information, ideas and events	AF4 – construct paragraphs and use cohesion within and between paragraphs	AF1 – write imaginative, interesting and thoughtful texts	AF2 – produce texts which are appropriate to task, reader and purpose	AF7 – select appropriate vocabulary used, and effective vocabulary	AF8 – use correct spelling	Handwriting and presentation
Level 3	In most writing ● reliance mainly on simply structured sentences, variation with support, e.g. some complex sentences ● and, but, so are the most common connectives ● some limited subordination occasionally ● some limited variation in use of tense and verb forms, not always secure	In most writing ● straightforward sentences usually demarcated accurately with full stops, capital letters, question marks and exclamation marks ● some, limited, use of speech punctuation ● comma splicing evident, particularly in narrative	In most writing ● some attempt to organise ideas with related points placed next to each other ● openings and closings usually signalled ● some attempt to sequence ideas or material logically	In most writing ● some internal structure within sections of text, e.g. one-sentence paragraphs or ideas loosely organised within paragraphs/sections, some links between sentences, e.g. use of pronouns or of adverbials ● movement between paragraphs/sections sometimes abrupt or disjointed	In most writing ● some appropriate ideas and content included ● some attempt to elaborate on basic information or events, e.g. nouns expanded by simple adjectives ● attempt to adopt viewpoint, though often not maintained or inconsistent, e.g. attitude expressed, but with little elaboration	In most writing ● purpose established at a general level ● main features of selected form sometimes signalled to the reader ● some attempts at appropriate style, with attention to reader	In most writing ● simple, generally appropriate vocabulary used, limited in range ● some words selected for effect or occasion	In most writing ● correct spelling of – some common grammatical function words – common content/lexical words with more than one morpheme, including compound words ● likely errors – some inflected endings, e.g. past tense, comparatives, adverbs – some phonetically plausible attempts at content/lexical words	In most writing ● legible style, shows accurate and consistent letter formation, sometimes joined
Level 2	In some forms of writing ● some variation in sentence openings, e.g. not always starting with name or pronoun ● mainly simple sentences with and used to connect clauses ● past and present tense generally consistent	In some forms of writing ● clause structure mostly grammatically correct ● sentence demarcation with capital letters and full stops usually accurate ● some accurate use of question and exclamation marks, and commas in lists	In some forms of writing ● some basic sequencing of ideas or material, e.g. time-related words or phrases, line breaks, headings, numbers ● openings and/or closings sometimes signalled	In some forms of writing ● ideas in sections grouped by content, some linking by simple pronouns	In some forms of writing ● mostly relevant ideas and content, sometimes repetitive or sparse ● some apt word choices create interest ● brief comments, questions about events or actions suggest viewpoint	In some forms of writing ● some basic purpose established, e.g. main features of story, report ● some appropriate features of the given form used ● some attempts to adopt appropriate style	In some forms of writing ● simple, often speech-like vocabulary conveys relevant meanings ● some word choices, e.g. opportune use of new vocabulary	In some forms of writing ● usually correct spelling of – high frequency grammatical function words – common single morpheme content/lexical words ● likely errors – inflected endings, e.g. past tense, plurals, adverbs – phonetic attempts at vowel digraphs	In some forms of writing ● letters generally correctly shaped but inconsistencies in orientation, size and use of upper/lower case letters ● clear letter formation, with ascenders and descenders distinguished, generally upper and lower case letters not mixed within words
BL	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
IE	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Key: BL-Below Level IE-Insufficient Evidence

Overall assessment (tick one box only)

High 3 ☐ Secure 3 ☐ Low 3 ☐ High 2 ☐ Secure 2 ☐ Low 2 ☐

¹ Available from:

<http://webarchive.nationalarchives.gov.uk/20110809101133/nsonline.org.uk/node/16051>, last accessed 12/06/2012

Writing assessment guidelines: levels 3 and 4
Name:

	AF5 – vary sentences for clarity, purpose and effect	AF6 – write with technical accuracy of syntax and punctuation in phrases, clauses and sentences	AF3 – organise and present whole texts effectively, sequencing and structuring information, ideas and events	AF4 – construct paragraphs and use cohesion within and between paragraphs	AF1 – write imaginative, interesting and thoughtful texts	AF2 – produce texts which are appropriate to task, reader and purpose	AF7 – select appropriate and effective vocabulary	AF8 – use correct spelling	Handwriting and presentation
Level 4	<p>Across a range of writing</p> <ul style="list-style-type: none"> some variety in length, structure or subject of sentences use of some subordinating connectives, e.g. <i>if, when, because</i> throughout the text some variation, generally accurate, in tense and verb forms 	<p>Across a range of writing</p> <ul style="list-style-type: none"> sentences demarcated accurately throughout the text, including question marks speech marks denote speech generally accurately, with some other speech punctuation commas used in lists and occasionally to mark clauses, although not always accurately 	<p>Across a range of writing</p> <ul style="list-style-type: none"> ideas organised by clustering related points or by time sequence ideas are organised simply with a fitting opening and closing, sometimes linked ideas or material generally in logical sequence but overall direction of writing not always clearly signalled 	<p>Across a range of writing</p> <ul style="list-style-type: none"> paragraphs/sections help to organise content, e.g. <i>main idea</i> usually supported or elaborated by following sentences within paragraphs/sections, limited range of connections between sentences, e.g. <i>on the other hand</i> or <i>provisional</i> some attempts to establish simple links between paragraphs/sections not always maintained, e.g. <i>firstly, next</i> 	<p>Across a range of writing</p> <ul style="list-style-type: none"> relevant ideas and content chosen some ideas and material developed in detail, e.g. descriptions elaborated by adverbial and expanded noun phrases straightforward viewpoint generally established and maintained, e.g. <i>writing in role or maintaining a consistent stance</i> 	<p>Across a range of writing</p> <ul style="list-style-type: none"> main purpose of writing is clear but not always consistently maintained main features of selected form are clear and appropriate to purpose style generally appropriate to task, though awareness of reader not always sustained 	<p>Across a range of writing</p> <ul style="list-style-type: none"> some evidence of deliberate vocabulary choices some expansion of general vocabulary to match topic 	<p>Across a range of writing</p> <ul style="list-style-type: none"> correct spelling of – most common grammatical function words, including adverbs with –ly formation regularly formed content/lexical words, including those with multiple morphemes most past and present tense inflections, plurals likely errors – homophones of some common grammatical function words occasional phonetically plausible spelling in content/lexical words 	
Level 3	<p>In most writing</p> <ul style="list-style-type: none"> reliance mainly on simply structured sentences, variation with support, e.g. <i>some complex sentences</i> <i>and but, so</i> are the most common connectives, subordinating occasionally some limited variation in use of tense and verb forms, not always secure 	<p>In most writing</p> <ul style="list-style-type: none"> straightforward sentences usually demarcated accurately with full stops, capital letters, question marks and exclamation marks some, limited, use of speech punctuation comma splicing evident, particularly in narrative 	<p>In most writing</p> <ul style="list-style-type: none"> some attempt to organise ideas with related points placed next to each other openings and closings usually signalled some attempt to sequence ideas or material logically 	<p>In most writing</p> <ul style="list-style-type: none"> some internal structure within sections of text, e.g. <i>one-sentence paragraphs</i> or <i>loosely organised</i> within paragraphs/sections, some links between sentences, e.g. <i>use of pronouns or adverbials</i> movement between paragraphs/sections sometimes abrupt or disjointed 	<p>In most writing</p> <ul style="list-style-type: none"> some appropriate ideas and content included some attempt to elaborate on basic information or events, e.g. nouns expanded by simple adjectives attempt to adopt viewpoint, though often not maintained or inconsistent, e.g. <i>attitude expressed, but with little elaboration</i> 	<p>In most writing</p> <ul style="list-style-type: none"> purpose established at a general level main features of selected form signalled to the reader some attempts at appropriate style, with attention to reader 	<p>In most writing</p> <ul style="list-style-type: none"> simple, generally appropriate vocabulary used, limited in range some words selected for effect or occasion 	<p>In most writing</p> <ul style="list-style-type: none"> correct spelling of – some common grammatical function words common content/lexical words with more than one morpheme, including compound words likely errors – some inflected endings, e.g. <i>past tense, comparatives, adverbs</i> some phonetically plausible attempts at content/lexical words 	<p>In most writing</p> <ul style="list-style-type: none"> legible style, shows accurate and consistent letter formation, sometimes joined
BL									
IE									

Key: BL-Below Level IE-Insufficient Evidence

Overall assessment (tick one box only)

Low 3

Secure 3

High 3

Low 4

Secure 4

High 4

Writing assessment guidelines: levels 4 and 5

Name.....		AF5 – vary sentences for clarity, purpose and effect	AF6 – write with technical accuracy of syntax and punctuation in phrases, clauses and sentences	AF3 – organise and present whole texts effectively, sequencing information, ideas and events	AF4 – construct paragraphs and use cohesion within and between paragraphs	AF1 – write imaginative, interesting and thoughtful texts	AF2 – produce texts which are appropriate to task, reader and purpose	AF7 – select appropriate and effective vocabulary	AF8 – use correct spelling
Level 5		<ul style="list-style-type: none"> Across a range of writing • a variety of sentence lengths, structures and subjects • provides clarity and emphasis • wider range of connectives used to clarify relationship between ideas, e.g. <i>although, on the other hand, meanwhile</i> • some features of sentence structure used to build up detail or convey shades of meaning, e.g. <i>variation in word order, expansions in verb phrases</i> 	<ul style="list-style-type: none"> Across a range of writing • full range of punctuation used accurately to demarcate sentences, including speech punctuation • syntax and punctuation within the sentence generally accurate including commas to mark clauses, though some errors occur where ambitious structures are attempted 	<ul style="list-style-type: none"> Across a range of writing • material is structured clearly, with sentences organised into appropriate paragraphs • development of material is effectively managed across text, e.g. closings refer back to openings • overall direction of the text supported by clear links between paragraphs 	<ul style="list-style-type: none"> Across a range of writing • paragraphs clearly structure main ideas across text to support purpose, e.g. <i>clear chronological or logical links between paragraphs</i> • within paragraphs/sections, a range of devices support cohesion, e.g. <i>secure use of pronouns, connectives, references back to text</i> • links between paragraphs/sections generally maintained across whole text 	<ul style="list-style-type: none"> Across a range of writing • relevant ideas and material developed with some imaginative detail • development of ideas and material appropriately shaped for selected form, e.g. <i>narration for succinctness</i> • clear viewpoint established, generally consistent, with some uneven, development of individual voice or characterisation in role 	<ul style="list-style-type: none"> Across a range of writing • main purpose of writing is clear and consistently maintained • selected form clearly established with some adaptation to purpose • appropriate style clearly established to maintain reader's interest throughout 	<ul style="list-style-type: none"> Across a range of writing • vocabulary chosen for effect • reasonably wide vocabulary used, though not always appropriately 	<ul style="list-style-type: none"> Across a range of writing • correct spelling of grammatical function words • almost all inflected words • most derivational suffixes and prefixes • most content/lexical words • likely errors • occasional phonetically plausible spelling of unstressed syllables in content words • double consonants in prefixes
Level 4		<ul style="list-style-type: none"> Across a range of writing • some variety in length, structure or subject of sentences • use of some subordinating connectives, e.g. <i>if, when, because</i> throughout the text • some variation, generally accurate, in tense and verb forms 	<ul style="list-style-type: none"> Across a range of writing • sentences demarcated accurately throughout the text, including question marks • speech marks to denote speech generally accurate, with some other speech punctuation in lists and occasionally to mark clauses, although not always accurately 	<ul style="list-style-type: none"> Across a range of writing • ideas organised by clustering related points or by time sequence • ideas are organised simply with a fitting opening and closing, sometimes linked • ideas or material generally in logical sequence but overall direction of writing not always clearly signalled 	<ul style="list-style-type: none"> Across a range of writing • paragraphs / sections help to organise content, e.g. <i>main idea usually supported or elaborated by following sentences</i> • within paragraphs/sections, limited range of connections between sentences, e.g. <i>overuse of also or pronouns</i> • some attempts to establish simple links between paragraphs/sections not always maintained, e.g. <i>firstly, next</i> 	<ul style="list-style-type: none"> Across a range of writing • relevant ideas and content chosen • some ideas and material developed in detail, e.g. <i>descriptions elaborated by adverbial phrases</i> • straightforward viewpoint generally established and maintained, e.g. <i>writing in role or maintaining a consistent stance</i> 	<ul style="list-style-type: none"> Across a range of writing • main purpose of writing is clear but not always consistently maintained • main features of selected form are clear and appropriate to purpose • style generally appropriate to task, though awareness of reader not always sustained 	<ul style="list-style-type: none"> Across a range of writing • some evidence of deliberate vocabulary choices • some expansion of general vocabulary to match topic 	<ul style="list-style-type: none"> Across a range of writing • correct spelling of most common grammatical function words, including adverbs with -ly formation • regularly formed content/lexical words, including those with multiple morphemes • most past and present tense inflections, plurals • likely errors • homophones of some common grammatical function words • occasional phonetically plausible spelling in content/lexical words
BL									
IE									

Key: BL-Below Level IE-Insufficient Evidence

Overall assessment (tick one box only)

High 5

Secure 5

Low 5

High 4

Secure 4

Low 4

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6 The National Strategies | Secondary
Assessing pupils' progress in English at Key Stage 3: Assessment guidelines

Writing assessment guidelines: levels 7 and 8
Name:

	AF5 – vary sentences for clarity, purpose and effect	AF6 – write with technical accuracy of syntax and punctuation in phrases, clauses and sentences	AF3 – organise and present whole texts effectively, sequencing and structuring information, ideas and events	AF4 – construct paragraphs and use cohesion within and between paragraphs	AF1 – write imaginative, interesting and thoughtful texts	AF2 – produce texts which are appropriate to task, reader and purpose	AF7 – select appropriate and effective vocabulary	AF8 – use correct spelling
Level 8	Across a range of writing <ul style="list-style-type: none"> ● sentence structure is imaginative, precise and accurate, matched to writer's purpose and intended effect on the reader <input type="checkbox"/>	Across a range of writing <ul style="list-style-type: none"> ● imaginative, well controlled structuring of subject matter and management of paragraphing provide textual coherence and cohesion to position the reader appropriately in relation to the writer's purpose <input type="checkbox"/>	Across a range of writing <ul style="list-style-type: none"> ● information, ideas and events skilfully managed and shaped to achieve intended purpose and effect, e.g. introduction and development of character, plot, event, or the terms of an argument, are paced across the text ● a variety of devices position the reader, e.g. skilful control of information flow to reader, teasing the reader by drawing attention to how the narrative or argument is being handled <input type="checkbox"/>	Across a range of writing <ul style="list-style-type: none"> ● paragraphing across the text is integral to meaning and purpose, e.g. paragraph length and complexity varied to match narrative pace or development of argument, varied devices to link or juxtapose paragraphs; paragraph structure repeated for effect ● individual paragraphs shaped or crafted for imaginative or rhetorical effect, e.g. last sentence echoing the first; lengthy single sentence paragraph to convey inner monologue <input type="checkbox"/>	Across a range of writing <ul style="list-style-type: none"> ● creative selection and adaptation of a wide range of forms and conventions to meet varied writing challenges with distinctive personal voice and style matched to intended effect <input type="checkbox"/>	Across a range of writing <ul style="list-style-type: none"> ● imaginative and generally successful adaptation of wide range of forms and audiences, e.g. deliberate reference to other texts or textual conventions for effect or emphasis ● well judged, distinctive individual voice or point of view established and sustained throughout, e.g. consistent handling of narrator's persona in fiction; well controlled use of original turns of phrase in formal discursive writing ● generally successful and consistent control of appropriate level of formality and varied range of stylistic devices to achieve intended effect, e.g. varying the level of formality within a piece for effect; direct address to the reader or taking the reader into their confidence <input type="checkbox"/>	Across a range of writing <ul style="list-style-type: none"> ● wide ranging vocabulary used imaginatively and with precision <input type="checkbox"/>	Across a range of writing <ul style="list-style-type: none"> ● correct spelling throughout <input type="checkbox"/>
Level 7	Across a range of writing <ul style="list-style-type: none"> ● variety of sentence types deployed judiciously across the text to achieve purpose and overall effect, with rare loss of control ● a range of features employed to shape/craft sentences that have individual merit and contribute to overall development of the text, e.g. embedded phrases and clauses that support succinct explanation; secure control of complex verb forms; anaphora, repetition or balance in sentence structure <input type="checkbox"/>	Across a range of writing <ul style="list-style-type: none"> ● information, ideas and events skilfully managed and shaped to achieve intended purpose and effect, e.g. introduction and development of character, plot, event, or the terms of an argument, are paced across the text ● a variety of devices position the reader, e.g. skilful control of information flow to reader, teasing the reader by drawing attention to how the narrative or argument is being handled <input type="checkbox"/>	Across a range of writing <ul style="list-style-type: none"> ● paragraphing across the text is integral to meaning and purpose, e.g. paragraph length and complexity varied to match narrative pace or development of argument, varied devices to link or juxtapose paragraphs; paragraph structure repeated for effect ● individual paragraphs shaped or crafted for imaginative or rhetorical effect, e.g. last sentence echoing the first; lengthy single sentence paragraph to convey inner monologue <input type="checkbox"/>	Across a range of writing <ul style="list-style-type: none"> ● imaginative and generally successful adaptation of wide range of forms and audiences, e.g. deliberate reference to other texts or textual conventions for effect or emphasis ● well judged, distinctive individual voice or point of view established and sustained throughout, e.g. consistent handling of narrator's persona in fiction; well controlled use of original turns of phrase in formal discursive writing ● generally successful and consistent control of appropriate level of formality and varied range of stylistic devices to achieve intended effect, e.g. varying the level of formality within a piece for effect; direct address to the reader or taking the reader into their confidence <input type="checkbox"/>	Across a range of writing <ul style="list-style-type: none"> ● creative selection and adaptation of a wide range of forms and conventions to meet varied writing challenges with distinctive personal voice and style matched to intended effect <input type="checkbox"/>	Across a range of writing <ul style="list-style-type: none"> ● imaginative and generally successful adaptation of wide range of forms and audiences, e.g. deliberate reference to other texts or textual conventions for effect or emphasis ● well judged, distinctive individual voice or point of view established and sustained throughout, e.g. consistent handling of narrator's persona in fiction; well controlled use of original turns of phrase in formal discursive writing ● generally successful and consistent control of appropriate level of formality and varied range of stylistic devices to achieve intended effect, e.g. varying the level of formality within a piece for effect; direct address to the reader or taking the reader into their confidence <input type="checkbox"/>	Across a range of writing <ul style="list-style-type: none"> ● wide ranging vocabulary used imaginatively and with precision <input type="checkbox"/>	Across a range of writing <ul style="list-style-type: none"> ● correct spelling throughout <input type="checkbox"/>
BL	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
IE	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Key: BL-Below Level IE-Insufficient Evidence								
Overall assessment (tick one box only)								
High 8 <input type="checkbox"/>			Secure 8 <input type="checkbox"/>			Low 8 <input type="checkbox"/>		
High 7 <input type="checkbox"/>			Secure 7 <input type="checkbox"/>			Low 7 <input type="checkbox"/>		

Reading assessment guidelines: levels 2 and 3
Name:

	AF1 – use a range of strategies, including accurate decoding of text, to read for meaning	AF2 – understand, describe, select or retrieve information, events or ideas from texts and use quotation and reference to text	AF3 – deduce, infer or interpret information, events or ideas from texts	AF4 – identify and comment on the structure and organisation of texts, including grammatical and presentational features at text level	AF5 – explain and comment on writers' use of language, including grammatical and literary features at word and sentence level	AF6 – identify and comment on writers' purposes and viewpoints, and the overall effect of the text on the reader	AF7 – relate texts to their social, cultural and historical traditions
Level 3	In most reading <ul style="list-style-type: none"> range of strategies used mostly effectively to read with fluency, understanding and expression 	In most reading <ul style="list-style-type: none"> simple, most obvious points identified though there may also be some misunderstanding, e.g. about information from different places in the text some comments include quotations from or references to text, but not always relevant, e.g. often retelling or paraphrasing sections of the text rather than using it to support comment 	In most reading <ul style="list-style-type: none"> straightforward inference based on a single point of reference in the text, e.g. <i>he was upset because it says 'he was crying'</i> responses to text show meaning established at a literal level e.g. <i>'walking good' means 'walking carefully'</i> or based on personal speculation e.g. <i>a response based on what they personally would be feeling rather than feelings of character in the text</i> 	In most reading <ul style="list-style-type: none"> a few basic features of organisation at text level identified, with little or no linked comment, e.g. <i>it tells about all the different things you can do at the zoo</i> 	In most reading <ul style="list-style-type: none"> a few basic features of writer's use of language identified, but with little or no comment, e.g. <i>there are lots of adjectives</i> 	In most reading <ul style="list-style-type: none"> comments identify main purpose, e.g. <i>'the writer doesn't like violence'</i> express personal response but with little awareness of writer's viewpoint or effect on reader, e.g. <i>'she was just horrible like my nan is sometimes'</i> 	In most reading <ul style="list-style-type: none"> some simple connections between texts identified, e.g. <i>similarities in plot, topic, or books by same author, about some characters</i> recognition of some features of the context of texts, e.g. <i>historical setting, social or cultural background</i>
Level 2	In some reading <ul style="list-style-type: none"> range of key words read on sight unfamiliar words decoded using appropriate strategies, e.g. <i>blending sounds</i> some fluency and expression, e.g. taking account of punctuation, speech marks 	In some reading <ul style="list-style-type: none"> some specific, straightforward information recalled, e.g. names of characters, main ingredients generally clear idea of where to look for information, e.g. about characters, topics 	In some reading <ul style="list-style-type: none"> simple, plausible inference about events and information, using evidence from text e.g. <i>how a character is feeling, what makes a plant grow</i> comments based on textual cues, sometimes misunderstood 	In some reading <ul style="list-style-type: none"> some awareness of use of features of organisation, e.g. beginning and ending of story, types of punctuation 	In some reading <ul style="list-style-type: none"> some effective language choices noted, e.g. <i>'slimy' is a good word there</i> some familiar patterns of language identified, e.g. <i>once upon a time; first, next, last</i> 	In some reading <ul style="list-style-type: none"> some awareness that writers have viewpoints and purposes, e.g. <i>'it tells you how to do something', 'she thinks it's not fair'</i> simple statements about likes and dislikes in reading, sometimes with reasons 	In some reading <ul style="list-style-type: none"> general features of a few text types identified, e.g. information books, stories, print media some awareness that books are set in different times and places
BL							
IE							

Key: BL-Below Level IE-Insufficient Evidence

Overall assessment (tick one box only)

High 3 ☐

Secure 3 ☐

Low 3 ☐

High 2 ☐

Secure 2 ☐

Low 2 ☐

Reading assessment guidelines: levels 3 and 4
Name:

	AF1 – use a range of strategies including accurate decoding off-text, to read for meaning	AF2 – understand, describe, select or retrieve information, events or ideas from texts and use quotation and reference to text	AF3 – deduce, infer or interpret information, events or ideas from texts	AF4 – identify and comment on the structure and organisation of texts, including grammatical and presentational features at text level	AF5 – explain and comment on writers' use of language, including grammatical and literary features at word and sentence level	AF6 – identify and comment on writers' purposes and viewpoints, and the overall effect of the text on the reader	AF7 – relate texts to their social, cultural and historical traditions
Level 4	<ul style="list-style-type: none"> use a range of strategies including accurate decoding off-text, to read for meaning 	<ul style="list-style-type: none"> understand, describe, select or retrieve information, events or ideas from texts and use quotation and reference to text 	<ul style="list-style-type: none"> deduce, infer or interpret information, events or ideas from texts 	<ul style="list-style-type: none"> identify and comment on the structure and organisation of texts, including grammatical and presentational features at text level 	<ul style="list-style-type: none"> explain and comment on writers' use of language, including grammatical and literary features at word and sentence level 	<ul style="list-style-type: none"> identify and comment on writers' purposes and viewpoints, and the overall effect of the text on the reader 	<ul style="list-style-type: none"> relate texts to their social, cultural and historical traditions
Level 3	<ul style="list-style-type: none"> range of strategies used mostly effectively to read with fluency, understanding and expression 	<ul style="list-style-type: none"> simple, most obvious points identified though there may also be some misunderstanding, e.g. about information from different places in the text some comments include quotations from or references to text, but not always relevant, e.g. often retelling or paraphrasing sections of the text rather than using it to support 	<ul style="list-style-type: none"> straightforward inference based on a single point of reference in the text, e.g. 'he was upset because it says "he was crying"' responses to text show meaning established at a literal level e.g. 'walking good' means 'walking carefully' or based on personal speculation e.g. a response based on what they personally would be feeling rather than feelings of character in the text 	<ul style="list-style-type: none"> a few basic features of organisation at text level identified, with little or no linked comment, e.g. 'It tells about all the different things you can do at the zoo' 	<ul style="list-style-type: none"> a few basic features of writer's use of language identified, but with little or no comment, e.g. 'There are lots of adjectives' 	<ul style="list-style-type: none"> comments identify main purpose, e.g. 'the writer doesn't like violence' express personal response but with little awareness of writer's viewpoint or effect on reader, e.g. 'he was just horrible like my nan is sometimes' 	<ul style="list-style-type: none"> some simple connections between texts identified, e.g. 'similarities in plot, topic, or books by same author, but about some characters' recognition of some features of the context of texts, e.g. historical setting, social or cultural background
BL							
IE							

Key: BL-Below Level IE-Insufficient Evidence
Overall assessment (tick one box only)

High 4 ☐ Secure 4 ☐ Low 4 ☐ High 3 ☐ Secure 3 ☐ Low 3 ☐

Reading assessment guidelines: levels 4 and 5
Name:

	AF2 – understand, describe, select or retrieve information, events or ideas from texts and use quotation and reference to text	AF3 – deduce, infer or interpret information, events or ideas from texts	AF4 – identify and comment on the structure and organisation of texts, including grammatical and presentational features at text level	AF5 – explain and comment on writers' use of language, including grammatical and literary features at word and sentence level	AF6 – identify and comment on writers' purposes and viewpoints, and the overall effect of the text on the reader	AF7 – relate texts to their social, cultural and historical traditions
Level 5	<p>Across a range of reading</p> <ul style="list-style-type: none"> most relevant points clearly identified, including those selected from different places in the text comments generally supported by relevant textual reference or quotation, even when points made are not always accurate 	<p>Across a range of reading</p> <ul style="list-style-type: none"> comments develop explanation of inferred meanings drawing on evidence across the text, e.g. 'You know her dad was lying because earlier she saw him take the letter' comments make inferences and deductions based on textual evidence, e.g. 'In drawing conclusions about a character's feelings on the basis of their speech and actions' 	<p>Across a range of reading</p> <ul style="list-style-type: none"> comments on structural choices show some general awareness of writer's craft, e.g. 'It tells you all things burglars can do to your house and then the alarm protects you' various features relating to organisation at text level, including form, are clearly identified, with some explanation, e.g. 'each section starts with a question as if he's answering the crowd' 	<p>Across a range of reading</p> <ul style="list-style-type: none"> various features of writer's use of language identified, with some explanation, e.g. 'when it gets to the climax they speak in short sentences and quickly which makes it more tense' comments show some awareness of the effect of writer's language choices, e.g. 'linked up' is a good way of describing how the blackberries go a bluey black colour as they ripen 	<p>Across a range of reading</p> <ul style="list-style-type: none"> main purpose clearly identified, often through general overview, e.g. 'the writer is strongly against war and wants to persuade the reader to agree' viewpoint in texts clearly identified, with some, often limited, explanation, e.g. 'at the end he knows he's done wrong and makes the snake sound attractive and mysterious' general awareness of effect on the reader, with some, often limited, explanation, e.g. 'you'd be persuaded to sign up because 25p a week doesn't seem that much to help someone see' 	<p>Across a range of reading</p> <ul style="list-style-type: none"> comments identify similarities and differences between texts, or versions, with some explanation, e.g. narrative conventions in traditional tales some explanation of how the contexts in which texts are written and read contribute to meaning, e.g. how historical context influenced adverts or war reports from different times/ places, or how a novel relates to when/where it was written
Level 4	<p>Across a range of reading</p> <ul style="list-style-type: none"> some relevant points identified comments supported by some generally relevant textual reference or quotation, e.g. reference is made to appropriate section of text but is unselective and lacks focus 	<p>Across a range of reading</p> <ul style="list-style-type: none"> comments make inferences based on evidence from different points in the text, e.g. 'interpreting a character's motive from their actions at different points' inferences often correct, but comments are not always rooted securely in the text or repeat narrative or content 	<p>Across a range of reading</p> <ul style="list-style-type: none"> some structural choices identified with simple comment, e.g. 'he describes the accident first and then goes back to tell you why the child was in the road' some basic features of organisation at text level identified, e.g. 'the writer uses bullet points for the main reasons' 	<p>Across a range of reading</p> <ul style="list-style-type: none"> some basic features of writer's use of language identified, e.g. 'all the questions make you want to find out what happens next' simple comments on writer's choices, e.g. 'disgraceful' is a good word to use to show he is upset' 	<p>Across a range of reading</p> <ul style="list-style-type: none"> main purpose identified, e.g. 'it's all about why going to the dentist is important and how you should look after your teeth' simple comments show some awareness of writer's viewpoint, e.g. 'he only tells you good things about the farm and makes the shop sound boring' simple comment on overall effect on reader, e.g. 'the way she describes him as "fatlike" and "shifty" makes you think he's disgusting' 	<p>Across a range of reading</p> <ul style="list-style-type: none"> features common to different texts or versions of the same text identified, with simple comment, e.g. characters, settings, presentational features simple comment on the effect that the reader's or writer's context has on the meaning of texts, e.g. historical context, place, social relationships
BL	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
IE	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Key: BL-Below Level IE-Insufficient Evidence
Overall assessment (tick one box only)

High 5 ☐ Secure 5 ☐ Low 5 ☐ High 4 ☐ Secure 4 ☐ Low 4 ☐

Reading assessment guidelines: levels 5 and 6
Name:

	AF2 - understand, describe, select or retrieve information, events or ideas from texts and use quotation and reference to text	AF3 - deduce, infer or interpret information, events or ideas from texts	AF4 - identify and comment on the structure and organisation of texts, including grammatical and presentational features at text level	AF5 - explain and comment on writers' use of language, including grammatical and literary features at word and sentence level	AF6 - identify and comment on writers' purposes and viewpoints, and the overall effect of the text on the reader	AF7 - relate texts to their social, cultural and historical traditions
Level 6	<p>Across a range of reading</p> <ul style="list-style-type: none"> relevant points clearly identified, including summary and synthesis of information from different sources or different places in the same text commentary incorporates apt textual reference and quotation to support main ideas or argument 	<p>Across a range of reading</p> <ul style="list-style-type: none"> comments securely based in textual evidence and identify different layers of meaning, with some attempt at detailed exploration of them, e.g. explaining the association of different words in an image, or exploring connotations in a political speech or advertisement comments consider wider implications or significance of information, events or ideas in the text, e.g. tracing how details contribute to overall meaning 	<p>Across a range of reading</p> <ul style="list-style-type: none"> some detailed exploration of how structural choices support the writers' theme or purpose, e.g. tracing how main ideas/characters develop over the text as a whole comment on how a range of features relating to organisation at text level contribute to the effects achieved, e.g. how the writer builds up to an unexpected ending, juxtaposes ideas, changes perspectives or uses everyday examples to illustrate complex ideas 	<p>Across a range of reading</p> <ul style="list-style-type: none"> some detailed explanation, with appropriate terminology, of how language is used, e.g. tracing an image, identifying and commenting on patterns or structure in the use of language, or recognising changes in language use at different points in a text some drawing together of comments on how the writer's language choices contribute to the overall effect on the reader, e.g. all the images of flowers make the events seem less horrific and makes it even sadder 	<p>Across a range of reading</p> <ul style="list-style-type: none"> evidence for identifying main purpose precisely located at word/sentence level or traced through a text, e.g. commenting on repetition of 'Brutus was an honourable man' viewpoint clearly identified and explanation of it developed through close reference to the text, e.g. 'you know it's told from Eric's point of view even though he doesn't use the first person' the effect on the reader clearly identified, with some explicit explanation as to how that effect has been created, e.g. 'When Macduff just says he has no children you hate Macbeth because you remember the scene in the castle. You realise Macduff's revenge can never be complete' 	<p>Across a range of reading</p> <ul style="list-style-type: none"> some exploration of textual conventions or features as used by writers from different periods, e.g. comparing examples of sonnet form, dramatic monologue, or biography or travel writing some detailed discussion of how the contexts in which texts are written and read affect meaning, e.g. how an idea/topic is treated differently in texts from different times and places or how the meaning of a text has changed over time
Level 5	<p>Across a range of reading</p> <ul style="list-style-type: none"> most relevant points clearly identified, including those selected from different places in the text comments generally supported by relevant textual reference or quotation, even when points made are not always accurate 	<p>Across a range of reading</p> <ul style="list-style-type: none"> comments develop explanation of inferred meanings drawing on evidence across the text, e.g. 'you know her dad was lying because earlier she saw him take the letter' comments make inferences and deductions based on textual evidence, e.g. in drawing conclusions about a character's feelings on the basis of their speech and actions 	<p>Across a range of reading</p> <ul style="list-style-type: none"> comments on structural choices show some general awareness of writer's craft, e.g. 'It tells you all things burglars can do to your house and then the last section explains how the alarm protects you' various features relating to organisation at text level, including form, are clearly identified, with some explanation, e.g. 'each section starts with a question as if he's answering the crowd' 	<p>Across a range of reading</p> <ul style="list-style-type: none"> various features of writer's use of language identified, with some explanation, e.g. 'when it gets to the climax they speak in short sentences and quickly which makes it more tense' comments show some awareness of the effect of writer's language choices, e.g. 'linked up' is a good way of describing how the blackberries go a blurry black colour as they ripen 	<p>Across a range of reading</p> <ul style="list-style-type: none"> main purpose clearly identified, often through general overview, e.g. 'the writer is strongly against war and wants to persuade the reader to agree' viewpoint in texts clearly identified, with some, often limited, explanation, e.g. 'at the end he knows he's done wrong and makes the snake sound attractive and mysterious' general awareness of effect on the reader, with some, often limited, explanation, e.g. 'you'd be persuaded to sign up because 25p a week doesn't seem that much to help someone see' 	<p>Across a range of reading</p> <ul style="list-style-type: none"> comments identify similarities and differences between texts, or versions, with some explanation, e.g. narrative conventions in traditional tales or stories from different cultures, ballads, newspaper reports some explanation of how the contexts in which texts are written and read contribute to meaning, e.g. how historical context influenced adverts or war reports from different times/ places; or how a novel relates to when/where it was written
BL	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
IE	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Key: BL-Below Level IE-Insufficient Evidence

Overall assessment (tick one box only)

High 6 ☐

Secure 6 ☐

Low 6 ☐

High 5 ☐

Secure 5 ☐

Low 5 ☐

Reading assessment guidelines: levels 6 and 7

Name:

	AF2 – understand, describe, select or retrieve information, events or ideas from texts and use quotation and reference to text	AF3 – deduce, infer or interpret information, events or ideas from texts	AF4 – identify and comment on the structure and organisation of texts, including grammatical and presentational features at text level	AF5 – explain and comment on writers' use of language, including grammatical and literary features at word and sentence level	AF6 – identify and comment on writers' purposes and viewpoints, and the overall effect of the text on the reader	AF7 – relate texts to their social, cultural and historical traditions
Level 7	<p>Across a range of reading</p> <ul style="list-style-type: none"> increasing precision in selection and application of textual reference to the point being made, e.g. close reference at word level to refute an argument in a short stretch of text, or, deft selection across a longer textual stretch to evaluate a writer's viewpoint increasing ability to draw on knowledge of other sources to develop or clinch an argument, e.g. referring to sources beyond the text to compare the effectiveness of imagery used 	<p>Across a range of reading</p> <ul style="list-style-type: none"> comments begin to develop an interpretation of the text(s), making connections between insights, teasing out meanings or weighing up evidence, e.g. considering the relative importance of different pieces of evidence when evaluating a character's actions; reflecting an argument after exploring what is left unsaid by its proponent; developing a critique of a writer's viewpoint by adducing evidence from a range of insights 	<p>Across a range of reading</p> <ul style="list-style-type: none"> some evaluation of the extent to which structural choices support the writer's theme or purpose, e.g. exploration of the way a play's plot and subplots reflect on theme, or analysis of how the use of some inappropriate examples undermine the writer's argument against vivisection some appreciation of the skill with which a range of features relating to organisation at text level are used, e.g. evaluating or comparing the effectiveness of time switches, section/ chapter breaks or verse forms or use of direct speech in non narrative 	<p>Across a range of reading</p> <ul style="list-style-type: none"> comments begin to develop precise, perceptive analysis of how language is used, e.g. showing how language use reflects Macbeth's changing emotional state or explaining how euphemisms conceal brutality in a political statement some appreciation of how the writer's language choices contribute to the overall effect on the reader, e.g. demonstrating the greater effectiveness of imagery in poem A than poem B, or arguing that the use of highly emotive language in a campaign leaflet is/is not counterproductive in audience effect 	<p>Across a range of reading</p> <ul style="list-style-type: none"> responses begin to develop some analytic or evaluative comment on writer's purpose, e.g. showing how the absence of females in Lord of the Flies affects author's purpose responses begin to develop some analytic or evaluative comment on how viewpoint is established or managed across a text, e.g. tracing how a persona is established in a weekly newspaper column or dramatic monologue, or how a novelist establishes a first person narrator responses begin to develop an appreciation of how particular techniques and devices achieve the effects they do, e.g. how the dramatic monologues serve to retain sympathy for Macbeth despite what he has done 	<p>Across a range of reading</p> <ul style="list-style-type: none"> responses begin to show some analysis of how a text is influenced by earlier texts written within the same tradition, e.g. how some features of a contemporary text show influence of earlier examples of that genre some analysis of how different meanings and interpretations of a text relate to the contexts in which it was written or read, e.g. how a particular context influences writers in different ways; or how the meaning or interpretation of a text changes according to the context in which it is read
Level 6	<p>Across a range of reading</p> <ul style="list-style-type: none"> relevant points clearly identified, including summary and synthesis of information from different sources or different places in the same text commentary incorporates apt textual reference and quotation to support main ideas or argument 	<p>Across a range of reading</p> <ul style="list-style-type: none"> comments securely based in textual evidence and identify different layers of meaning, with some attempt at detailed exploration of them, e.g. explaining the association of different words in an image, or exploring connotations in a political speech or advertisement comments consider wider implications or significance of information, events or ideas in the text, e.g. tracing how details contribute to overall meaning 	<p>Across a range of reading</p> <ul style="list-style-type: none"> some detailed exploration of how structural choices support the writers' theme or purpose, e.g. tracing how main ideas/characters develop over the text as a whole comment on how a range of features relating to organisation at text level contribute to the effects achieved, e.g. how the writer builds up to an unexpected ending, juxtaposes ideas, changes perspectives or uses everyday examples to illustrate complex ideas 	<p>Across a range of reading</p> <ul style="list-style-type: none"> some detailed explanation, with appropriate terminology, of how language is used, e.g. tracing an image/identifying and commenting on patterns or structure in the use of language; or recognising changes in language use at different points in a text some drawing together of comments on how the writer's language choices contribute to the overall effect on the reader, e.g. all the images of flowers make the events seem less horrific and makes it even sadder 	<p>Across a range of reading</p> <ul style="list-style-type: none"> evidence for identifying main purpose precisely located at word/sentence level or traced through a text, e.g. commenting on repetition of Brutus was an honourable man viewpoint clearly identified and explanation of it developed through close reference to the text, e.g. you know it's told from Eric's point of view even though he doesn't use the first person the effect on the reader clearly identified, with some explicit explanation as to how that effect has been created, e.g. 'when Macduff just says he has no children you hate Macbeth because you remember the scene in the castle. You realise Macduff's revenge can never be complete' 	<p>Across a range of reading</p> <ul style="list-style-type: none"> some exploration of textual conventions or features as used by writers from different periods, e.g. comparing examples of sonnet form, dramatic monologue, or biography or travel writing some detailed discussion of how the contexts in which texts are written and read affect meaning, e.g. how an ideal topic is treated differently in texts from different times and places or how the meaning of a text has changed over time
BL	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
IE	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Key: BL-Below Level IE-Insufficient Evidence

Overall assessment (tick one box only)

Low 6

Secure 6

High 6

Low 7

Secure 7

High 7

Reading assessment guidelines: levels 7 and 8

Name:

	AF2 – understand, describe, select or retrieve information, events or ideas from texts and use quotation and reference to text	AF3 – deduce, infer or interpret information, events or ideas from texts	AF4 – identify and comment on the structure and organisation of texts, including grammatical and presentational features at text level	AF5 – explain and comment on writers' use of language, including grammatical and literary features at word and sentence level	AF6 – identify and comment on writers' purposes and viewpoints, and the overall effect of the text on the reader	AF7 – relate texts to their social, cultural and historical traditions
Level 8	<p>Across a range of reading</p> <ul style="list-style-type: none"> clear critical stance develops a coherent interpretation of text(s), drawing on imaginative insights and well supported by reference and wider textual knowledge 	<input type="checkbox"/>	<p>Across a range of reading</p> <ul style="list-style-type: none"> clear appreciation and understanding of how the text structure and language use support the writer's purpose and contribute to meaning 	<input type="checkbox"/>	<p>Across a range of reading</p> <ul style="list-style-type: none"> response to overall effect of the text shows clear understanding and critical evaluation of writer's purposes and viewpoints and how these are articulated throughout the text 	<p>Across a range of reading</p> <ul style="list-style-type: none"> sustained critical analysis/evaluation of the text(s) shows appreciation of how it relates to context(s) and tradition(s) and explores the meanings produced from it
Level 7	<p>Across a range of reading</p> <ul style="list-style-type: none"> increasing precision in selection and application of textual reference to the point being made, e.g. close reference at word level to relate an argument in a short stretch of text, or, deft selection across a longer textual stretch to evaluate a writer's viewpoint increasing ability to draw on knowledge of other sources to develop or clinch an argument, e.g. referring to sources beyond the text to compare the effectiveness of imagery used 	<p>Across a range of reading</p> <ul style="list-style-type: none"> comments begin to develop an interpretation of the text(s), making connections between insights, teasing out meanings or weighing up evidence, e.g. considering the relative importance of different pieces of evidence when evaluating a character's actions; rejecting an argument after exploring what is left unsaid by its proponent; developing a critique of a writer's viewpoint by adducing evidence from a range of insights 	<p>Across a range of reading</p> <ul style="list-style-type: none"> some evaluation of the extent to which structural choices support the writer's theme or purpose, e.g. exploration of the way a play's plot and subplot reflect on theme, or analysis of how the use of some inappropriate examples undermine the writer's argument against vivisection some appreciation of the skill with which a range of features relating to organisation at text level are used, e.g. evaluating or comparing the effectiveness of time switches, section/chapter breaks or verse forms or use of direct speech in non narrative 	<p>Across a range of reading</p> <ul style="list-style-type: none"> comments begin to develop precise, perceptive analysis of how language is used, e.g. showing how language use reflects Macbeth's changing emotional state or explaining how euphemisms conceal brutality in a political statement some appreciation of how the writer's language choices contribute to the overall effect on the reader, e.g. demonstrating the greater effectiveness of imagery in poem A than poem B, or arguing that the use of highly emotive language in a campaign leaflet is not counterproductive in audience effect 	<p>Across a range of reading</p> <ul style="list-style-type: none"> responses begin to develop some analytic or evaluative comment on writer's purpose, e.g. showing how the absence of females in Lord of the Flies affects author's purpose responses begin to develop some analytic or evaluative comment on how viewpoint is established or managed across a text, e.g. tracing how a persona is established in a weekly newspaper column or dramatic monologue, or how a novelist establishes a first person narrator responses begin to develop an appreciation of how particular techniques and devices achieve the effects they do, e.g. how the dramatic monologues serve to retain sympathy for Macbeth despite what he has done 	<p>Across a range of reading</p> <ul style="list-style-type: none"> responses begin to show some analysis of how a text is influenced by earlier texts written within the same tradition, e.g. how some features of a contemporary text show influence of earlier examples of that genre some analysis of how different meanings and interpretations of a text relate to the contexts in which it was written or read, e.g. how a particular context influences writers in different ways; or how the meaning or interpretation of a text changes according to the context in which it is read
BL	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
IE	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Key: BL-Below Level IE-Insufficient Evidence

Overall assessment (tick one box only)

High 8 ☐Secure 8 ☐Low 8 ☐High 7 ☐Secure 7 ☐Low 7 ☐

Appendix B.4: Information on National Curriculum Sub-level Values²

Many schools are finding that by assessing pupils using National Curriculum sublevels on a regular basis, pupils who are making less than satisfactory progress are quickly identified and support for them can be given. A common way of dividing the National Curriculum levels is the use of an a, b, c indicator:

- a - represents strong level;
- b - represents sound level;
- c - represents a weak level.

So a pupil would progress from a 1a, into a 2c, then 2b to a 2a.

This table provides a handy reference to look up point score and level/sublevel equivalents.

Caution should be used with sublevels as the National Curriculum level was designed to indicate representative attainment at the end of a key stage, a sublevel only gives a indication of the certainty of this achievement but can be extremely useful in identifying progress and support requirements. For calculation purposes some schools have represented levels as decimalised values.

Level	Point score
1c	7
1b	9
1a	11
2c	13
2b	15
2a	17
3c	19
3b	21
3a	23
4c	25
4b	27
4a	29
5c	31
5b	33
5a	35
6c	37
6b	39
6a	41
7c	43
7b	45
7a	47
8c	49
8b	51
8a	53

² Information taken from:

<http://webarchive.nationalarchives.gov.uk/20110202093118/http://nationalstrategies.standards.dcsf.gov.uk/node/169974>, last accessed 29/07/2011

Appendix B.5: Module Statistics – Independent Samples Mann Whitney U Test on distribution between Toolset Basic and Toolset NT Classes – School Study

Type	N	Z	Mann-Whitney U	r	Asymp. Sig. (2-tailed)
<i>Number of areas</i>	53	-.15	344	-0.016	.908
<i>Total number of creatures</i>	53	-2.62	203	-0.360	.009*
<i>Total number of hostile creatures</i>	53	-1.63	259	-0.223	.104
<i>Total number of commoner creatures</i>	53	-1.08	290	-0.148	.282
<i>Total number of defender creatures</i>	53	-.81	305	-0.111	.417
<i>Total number of merchant creatures</i>	53	-1.08	301	-0.148	.282
<i>Total number of creatures with conversations</i>	53	-.99	296.5	-0.136	.324
<i>Total number of trees</i>	53	-.40	328	-0.054	.693
<i>Total number of placeables</i>	53	-1.74	252.5	-0.239	.082
<i>Total number of items</i>	53	-.32	332.5	-0.044	.747
<i>Total number of placed effects</i>	53	-3.30	188.5	-0.454	.001**
<i>Total number of doors</i>	53	-1.51	265.5	-0.208	.130
<i>Total number of doors with connections</i>	53	-1.38	277.5	-0.189	.169
<i>Total number of conversations written</i>	53	-.42	327.5	-0.057	.676
<i>Total conversation word count</i>	53	-.69	311.5	-0.094	.492
<i>Number of custom scripts written</i>	53	-.11	344	-0.015	.914
<i>Number of unique Flip scripts</i>	53	-.07	346	-0.010	.942
<i>Number of attached Flip scripts</i>	53	-.29	334.5	-0.040	.771
<i>Total attached conversation action count</i>	53	-.58	320.5	-0.079	.564
<i>Total attached conversation condition count</i>	53	.00	350	0	1.000

* sig at .01

** sig at .001

Appendix B.6: Online Survey Questions – School Study

Question	Response options
<i>What is your name?</i>	Open-Ended Response
<i>How old are you?</i>	Open-Ended Response
<i>What class are you in?</i>	Open-Ended Response
<i>Think about these different game making tasks - tick as many boxes as are true</i>	Working on the terrain and decoration of areas - I enjoyed this
	Working on the terrain and decoration of areas - This was hard
	Working on the terrain and decoration of areas - This was important to my game
	Working on the terrain and decoration of areas - I didn't do this
	Adding characters and objects - I enjoyed this
	Adding characters and objects - This was hard
	Adding characters and objects - This was important to my game
	Adding characters and objects - I didn't do this
	Creating interior areas - I enjoyed this
	Creating interior areas - This was hard
	Creating interior areas - This was important to my game
	Creating interior areas - I didn't do this
	Creating area transitions - I enjoyed this
	Creating area transitions - This was hard
	Creating area transitions - This was important to my game
	Creating area transitions - I didn't do this
	Writing conversations - I enjoyed this
	Writing conversations - This was hard
	Writing conversations - This was important to my game
	Writing conversations - I didn't do this
	Creating Flip scripts - I enjoyed this
	Creating Flip scripts - This was hard
	Creating Flip scripts - This was important to my game
	Creating Flip scripts - I didn't do this
<i>Think about these different game making tasks and tick as many boxes as are true</i>	Working on the terrain and decoration of areas - I enjoyed this
	Working on the terrain and decoration of areas - This was hard
	Working on the terrain and decoration of areas - This was important to my game
	Working on the terrain and decoration of areas - I didn't do this
	Creating characters and objects - I enjoyed this
	Creating characters and objects - This was hard
	Creating characters and objects - This was important to my game
	Creating characters and objects - I didn't do this
	Creating interior areas - I enjoyed this
	Creating interior areas - This was hard
	Creating interior areas - This was important to my game
	Creating interior areas - I didn't do this
	Creating area transitions - I enjoyed this
	Creating area transitions - This was hard
	Creating area transitions - This was important to my game
	Creating area transitions - I didn't do this
	Writing conversations - I enjoyed this
	Writing conversations - This was hard
	Writing conversations - This was important to my game
	Writing conversations - I didn't do this
	Creating Flip scripts - I enjoyed this

	Creating Flip scripts - This was hard
	Creating Flip scripts - This was important to my game
	Creating Flip scripts - I didn't do this
	Working on the game planning diagram - I enjoyed this
	Working on the game planning diagram - This was hard
	Working on the game planning diagram - This was important to my game
	Working on the game planning diagram - I didn't do this
	Using the story icons on the map - I enjoyed this
	Using the story icons on the map - This was hard
	Using the story icons on the map - This was important to my game
	Using the story icons on the map - I didn't do this
<i>What is the story of your game:</i>	Open-Ended Response
<i>Did you use ideas from the myth you wrote in English for your game? (e.g. characters, settings, plot)</i>	Multiple-choice Response <ul style="list-style-type: none"> • All of it • Some of it • None of it
<i>How easy or hard do you think a player would find these different things in your game?</i> <ul style="list-style-type: none"> • Very Easy • Quite Easy • Not too easy, not too hard • Quite hard • Very hard 	Understanding what they're supposed to do
	Fighting other creatures
	Finding their way around your area(s)
<i>What is the file name the final version of your module is saved as? (E.g. 'kathyhowland.mod')</i>	Open-Ended Response
<i>How easy or hard did you find these parts of Flip?</i> <ul style="list-style-type: none"> • Very Easy • Quite Easy • Not too easy, not too hard • Quite hard • Very hard 	Placing the blocks in the right slots
	Finding the right blocks
	Knowing what to put in the 'When' box
	Knowing what action blocks to choose
	Knowing when your script was complete
	Knowing when your script was correct
<i>How much of Flip did you understand?</i>	Multiple-choice Response <ul style="list-style-type: none"> • All of it • Some of it • None of it
<i>What did you find confusing or annoying about Flip?</i>	Open-Ended Response
<i>What one thing would you change about Flip</i>	Open-Ended Response

<i>to make it better?</i>	
<i>How often did you check the description of your script at the bottom of the screen?</i>	Multiple-choice Response <ul style="list-style-type: none"> • Always • Sometimes • Never
<i>How many Flip scripts did you have in your game?</i>	Multiple-choice Response <ul style="list-style-type: none"> • 0 • 1 • 2 • 3 or more
<i>What kind of thing were you trying to make happen through scripting?</i>	Open-Ended Response
<i>Did your scripts work like you expected?</i>	Multiple-choice Response <ul style="list-style-type: none"> • Always • Sometimes • Never
<i>If they didn't, did you go back to them and try and fix them?</i>	Multiple-choice Response <ul style="list-style-type: none"> • Always • Sometimes • Never
<i>Why didn't you add any Flip scripts to your game?</i>	Multiple-choice Response <ul style="list-style-type: none"> • I missed the demos • I tried but I couldn't get it to do what I wanted • It was too hard • I didn't need any scripts in my game
<i>Did you enjoy the game making project?</i>	Multiple-choice Response <ul style="list-style-type: none"> • Yes, I enjoyed it and I'd like to do it again • I enjoyed some parts of it • No, I didn't enjoy the project

Appendix B.7: Survey Response – Independent Samples Mann Whitney U Tests on Differences between Groups – School Study

	U	Z	r	Asymp. Sig. (2-tailed)
<i>Working on the terrain and decoration of areas - I enjoyed this</i>	182	-.477	-0.07549	.633
<i>Working on the terrain and decoration of areas - This was hard</i>	192.5	-.217	-0.03437	.828
<i>Working on the terrain and decoration of areas - This was important to my game</i>	186	-.320	-0.05064	.749
<i>Working on the terrain and decoration of areas - I didn't do this</i>	187	-.860	-0.13593	.390
<i>Creating characters and objects - I enjoyed this</i>	147.5	-1.895	-0.29962	.058
<i>Creating characters and objects - This was hard</i>	178.5	-1.232	-0.19475	.218
<i>Creating characters and objects - This was important to my game</i>	189	-.230	-0.03635	.818
<i>Creating characters and objects - I didn't do this</i>	195.5	.000	0	1.000
<i>Creating interior areas - I enjoyed this</i>	150.5	-1.641	-0.25948	.101
<i>Creating interior areas - This was hard</i>	184.5	-.486	-0.07692	.627
<i>Creating interior areas - This was important to my game</i>	193	-.119	-0.01887	.905
<i>Creating interior areas - I didn't do this</i>	187	-.860	-0.13593	.390
<i>Creating area transitions - I enjoyed this</i>	159.5	-1.160	-0.18348	.246
<i>Creating area transitions - This was hard</i>	162	-1.185	-0.18732	.236
<i>Creating area transitions - This was important to my game</i>	169.5	-1.369	-0.21639	.171
<i>Creating area transitions - I didn't do this</i>	192.5	-.217	-0.03437	.828
<i>Writing conversations - I enjoyed this</i>	140	-1.773	-0.28032	.076
<i>Writing conversations - This was hard</i>	179	-.624	-0.09866	.533
<i>Writing conversations - This was important to my game</i>	160.5	-1.276	-0.20181	.202
<i>Writing conversations - I didn't do this</i>	169.5	-1.369	-0.21639	.171
<i>Did you enjoy the game making project?</i>	153	-.532	-0.08414	.595

Appendix B.8: Icon Versions used in Evaluative Field Studies



Figure B.8.1: left – icons used in school study, right – icons used in workshop study

Appendix B.9: Module Statistics – Independent Samples Mann Whitney U Test on distribution between Toolset Basic and Toolset NT Groups–Workshop Study

Type	N	Z	Mann-Whitney U	r	Asymp. Sig. (2-tailed)
<i>Number of areas</i>	14	-2.43	6	-0.65	.015*
<i>Total number of creatures</i>	14	-.44	21	-0.12	.654
<i>Total number of hostile creatures</i>	14	-.51	20.5	-0.14	.609
<i>Total number of commoner creatures</i>	14	-1.02	16.5	-0.27	.306
<i>Total number of defender creatures</i>	14	-.19	23	-0.05	.846
<i>Total number of merchant creatures</i>	14	-.07	24	-0.02	.943
<i>Total number of creatures with conversations</i>	14	-1.57	12.5	-0.42	.116
<i>Total number of trees</i>	14	-.13	23.5	-0.03	.898
<i>Total number of placeables</i>	14	-1.28	14.5	-0.34	.201
<i>Total number of items</i>	14	-1.16	15.5	-0.31	.247
<i>Total number of placed effects</i>	14	-.32	22.5	-0.09	.749
<i>Total number of doors</i>	14	-2.25	7	-0.60	.025
<i>Total number of doors with connections</i>	14	-.39	21.5	-0.10	.700
<i>Total number of conversations written</i>	14	-1.18	15.5	-0.32	.237
<i>Total conversation word count</i>	14	-2.11	8	-0.56	.035*
<i>Number of custom scripts written</i>	14	-1.54	12.5	-0.41	.124
<i>Number of unique Flip scripts</i>	14	-1.36	14	-0.36	.175
<i>Number of attached Flip scripts</i>	14	.00	24.5	0	1.000
<i>Total attached conversation action count</i>	14	-.71	19	-0.19	.479
<i>Total attached conversation condition count</i>	14	-2.61	7	-0.70	.009**

* sig at 0.05

** sig at 0.01

Appendix B.10: Game Box Packaging Template – Workshop Study

EXAMPLE TEMPLATE		
<div><div>About Your Game</div><div><p>What is the back-story to your game, and where is it set? Write about the world the game takes place in, what the player's goal is in the game, the adventures they can have, and the characters they will meet along the way. Give them a summary of the things they will encounter, but you might not want to give away the ending just yet! This is your chance to entice potential players to try your game and find out how the story ends! You could also use a screen shot to illustrate your text if you like.</p></div><div></div></div>	<div><div>GAME TITLE</div><div>By Game Designer</div></div>	<div><div>Game Title</div><div>By Game Designer</div></div> <div></div>
<div><div>Special Features and Highlights</div><div><p>This is your chance to show off some of the things you are most proud about in your game! You could include some information about your most interesting characters and perhaps include some screen shots of them.</p></div><div></div><div></div><div><p>You could also include some information about and images of important items in the game, or areas which are particularly beautiful, scary or exciting, or you could talk about key quests or battles which the player can take part in.</p></div></div>	<div><p><i>"A magical tale of darkness and light, the slow death of a forest, and the fight to save it from destruction! Only you can destroy the evil that threatens the lives of everyone." (Put a few lines here which give people an idea what to expect from your game)</i></p></div>	

Appendix C.1: Narrative-based Games Rating Scheme

1a. Does the game have a clear storyline?

(Please rate on a scale of 1 to 10)

Example ratings:

- ↑ 0: No evidence of any story ideas in area design, character or objects choices.
- 5: Some story ideas are communicated to the player through some elements of the game.
- ↓ 10: A clear storyline runs throughout the game and is supported by the visual design of the areas, characters, conversations, buildings and objects.

1b. Storyline is conveyed through (tick as many boxes as appropriate):

- ☐ Terrain/ texturing or tileset of area(s)
- ☐ Objects placed in area(s) (e.g. trees, buildings, furniture)
- ☐ Character appearances
- ☐ Character behaviours
- ☐ Character names
- ☐ Area or object names
- ☐ Character conversations
- ☐ Text on objects (i.e. signposts)
- ☐ Descriptions of objects
- ☐ Other: _____

2a. Are the game areas visually interesting?

(Please rate on a scale of 1 to 10)

Example ratings:

- ↑ 0: Areas are very sparse and very little attention has been paid to landscaping or decorating.
- 5: Areas have interesting elements. There is some sign of a coherent idea about the locations in the game, but there are elements which are incongruous or seem to have been placed without thought.
- ↓ 10: Areas are very visually interesting and successfully convey a convincing sense of the environment in which the game is set.

2b. *The designer has made use of the following in their area design (tick as many boxes as appropriate):*

- ☐ Raising or lowering ground to create a landscaped terrain
- ☐ Different textures to create pathways and other features on the ground
- ☐ Trees and vegetation
- ☐ Buildings and other manmade structures
- ☐ Creatures which appear to have been added as scenery or 'extras'
- ☐ Water
- ☐ Special effects (e.g. fire or light bolts)
- ☐ The creation of identifiable locations which help to emphasise an episode in the game (e.g. a dragon's lair, or a clearing in the forest where the player meets a woodcutter who helps him)
- ☐ Other: _____

3a. *How well does the designer guide the player about where to go?*

(Please rate on a scale of 1 to 10)

Example ratings:

- ↑ 0: The player is given no idea about where the interesting elements of the game are or how to find them.
- 5: The player is given some clues as to which way they should go, but they might be hard to understand or the clues themselves might be hard to find.
- 10: The player is guided in subtle but clear ways which are seamlessly integrated into conversations or area design elements such as paths or gaps in mountain ranges etc.
- ↓

3b. *The designer has made use of the following to guide the player spatially around the area(s) (tick as many boxes as appropriate):*

- ☐ Subtle hints in conversations
- ☐ Explicit directions in conversations
- ☐ Pathways
- ☐ Signposts
- ☐ Text in objects (e.g. a book)
- ☐ Landscaping elements such as clearing in trees or a valley
- ☐ Other: _____

4a. Does the player have a purpose in the game?

(Please rate on a scale of 1 to 10)

Example ratings:

- ↑ 0: The player has no idea where they are, why they are there, who is on their side or what they should do.
- 5: The player is given some clues as to what their objective might be, either through conversations, behaviours or area design, but other elements are left unexplained, e.g. the reasons why certain characters are their enemies.
- 10: The player is given clear information about and motivation for their goals.
- ↓

4b. The designer has made use of the following to give the player information about their goals or objectives (tick as many boxes as appropriate):

- ☐ Subtle hints in conversations
- ☐ Explicit explanations in conversations
- ☐ Character behaviours
- ☐ Text in objects (e.g. a book)
- ☐ Other: _____

5a. Is the player able to make meaningful choices in the game?

(Please rate on a scale of 1 to 10)

Example ratings:

- ↑ 0: The player has no choice at all in how to proceed through the game.
- 5: The player is given some choices in elements such as which way to proceed, which areas to explore or how to respond to characters, but these choices might not have a noticeable effect on how the plot proceeds.
- 10: The player is given choices which make a difference to how the game narrative proceeds, and has a real sense of agency about elements such as which quests to tackle and which characters to befriend and which to make enemies of.
- ↓

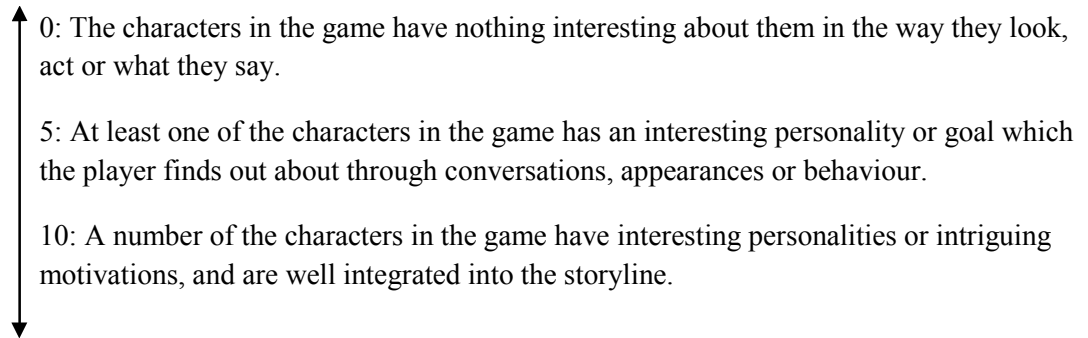
5b. The player has choices of the following kinds (tick as many boxes as appropriate):

- ☐ Taking different routes through an area
- ☐ Choices of what to say in a conversation
- ☐ Choices of what to say in a conversation with noticeable consequences
- ☐ Other _____

6a. Are there interesting characters for the player to meet?

(Please rate on a scale of 1 to 10)

Example ratings:



6b. Please pick two characters and explain why they are interesting or uninteresting

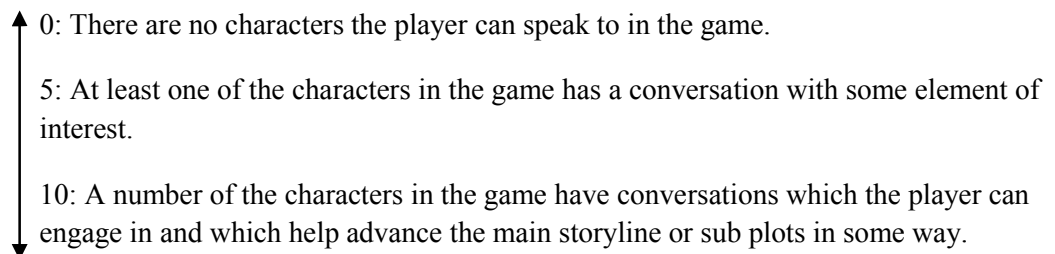
1.

2.

7a. Are there interesting dialogues for the player to engage in?

(Please rate on a scale of 1 to 10)

Example ratings:



7b. Some conversations in the game include the following (tick as many as appropriate):

- ☐ Humour
- ☐ Convincing dialect/ language chosen to illustrate character's background
- ☐ Good descriptive language
- ☐ Plot-advancing information
- ☐ 'Utilitarian' conversation – only existing to serve the purpose of making something happen through a script
- ☐ Other notable conversation characteristic: _

8a. Does the game show imagination?

(Please rate on a scale of 1 to 10)

Example ratings:

- ↑ 0: No aspects of the game show imagination or creativity – elements appear to have been included at random
- 5: The designer has had some interesting ideas and tried to incorporate elements which are novel, interesting or humorous in the characters, objects, areas or storyline.
- ↓ 10: The game has an imaginative storyline and inventive elements which are well-integrated and support the narrative.

*8b. Please give an example of an imaginative element in the game, if there are any:**9a. Is the challenge level of the game appropriate?*

(Please rate on a scale of 1 to 10)

Example ratings:

- ↑ 0: The game is much too hard or much too easy – the player keeps dying, or else there are no challenges or threats.
- 5: The designer has got the challenge level right in some places.
- ↓ 10: The whole game is well balanced with quests or missions which are pitched at the right level of challenge so that they are interesting but not impossible.

9b. The game includes (tick as many as appropriate):

- ☐ A challenge or quest to be completed
- ☐ A battle which is too hard for the player (involves dying multiple times)
- ☐ A battle which is of appropriate difficulty for the player (can be won after a short to medium length fight)
- ☐ Other challenge related element: _____

Appendix C.2: Inter-rater reliability correlations for Secondary School Study games

		R1 * R2 Correlation
Storyline	Pearson's r	.898**
	Sig. (2-tailed)	.000
	N	12
Visually Interesting	Pearson's r	.489
	Sig. (2-tailed)	.107
	N	12
Guide	Pearson's r	.678*
	Sig. (2-tailed)	.015
	N	12
Purpose	Pearson's r	.736**
	Sig. (2-tailed)	.006
	N	12
Choices	Pearson's r	.871**
	Sig. (2-tailed)	.000
	N	12
Interesting Characters	Pearson's r	.792**
	Sig. (2-tailed)	.002
	N	12
Interesting Dialogues	Pearson's r	.878**
	Sig. (2-tailed)	.000
	N	12
Imagination	Pearson's r	.854**
	Sig. (2-tailed)	.000
	N	12
Challenge	Pearson's r	.454
	Sig. (2-tailed)	.139
	N	12
Total	Pearson's r	.926**
	Sig. (2-tailed)	.000
	N	12

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

Appendix C.3 Mann Whitney U Tests between Toolset Basic & Toolset NT Groups – Secondary School Study

Type	N	Independent Samples Mann Whitney U Test on distribution between Toolset Basic and Toolset NT groups				
		Z	U	r	Probability of superiority	Asymptotic sig. (2-sided)
Storyline	53	1.74	444.5	0.24	0.63	.081
Visually Interesting	53	0.42	372.5	0.06	0.53	.678
Guide	53	1.54	432	0.21	0.62	.123
Purpose	53	1.43	427.5	0.20	0.61	.153
Choices	53	1.09	407	0.15	0.58	.276
Interesting Characters	53	0.83	395	0.11	0.56	.406
Interesting Dialogues	53	0.72	389.5	0.10	0.55	.469
Imagination	53	1.02	405	0.14	0.58	.307
Challenge	53	1.99	457.5	0.27	0.65	.046*
Total	53	1.71	445.5	0.23	0.63	.088

* Significant at the 0.05 level.

Appendix C.4: Inter-rater reliability correlations for Workshop Study games

		R1 * R2 Correlation
Storyline	Pearson Correlation	.736**
	Sig. (2-tailed)	.003
	N	14
Visually Interesting	Pearson Correlation	.699**
	Sig. (2-tailed)	.005
	N	14
Guiding	Pearson Correlation	.691**
	Sig. (2-tailed)	.006
	N	14
Purpose	Pearson Correlation	.746**
	Sig. (2-tailed)	.002
	N	14
Meaningful Choice	Pearson Correlation	.664**
	Sig. (2-tailed)	.010
	N	14
Interesting Characters	Pearson Correlation	.607*
	Sig. (2-tailed)	.021
	N	14
Dialogues	Pearson Correlation	.615*
	Sig. (2-tailed)	.019
	N	14
Imagination	Pearson Correlation	.607*
	Sig. (2-tailed)	.021
	N	14
Challenge	Pearson Correlation	.624*
	Sig. (2-tailed)	.017
	N	14
Total	Pearson Correlation	.727**
	Sig. (2-tailed)	.003
	N	14

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

Appendix C.5 Mann Whitney U Tests between Toolset Basic & Toolset NT Groups – Workshop Study

Type	N	Independent Samples Mann Whitney U Test on Game Rating distribution between Toolset Basic and Toolset NT Groups				
		Z	U	r	Effect Size (Probability of superiority)	Asymptotic sig. (2-sided)
Storyline	14	-1.827	10.500	-0.4884	0.79	.068
Visually Interesting	14	-2.142	9.000	-0.57246	0.82	.032*
Guide	14	-1.875	10.500	-0.50121	0.79	.061
Purpose	14	-1.641	12.000	-0.43859	0.76	.101
Choices	14	-1.193	15.500	-0.31876	0.68	.233
Interesting Characters	14	-1.645	12.000	-0.43961	0.76	.100
Interesting Dialogues	14	-1.317	14.500	-0.3521	0.7	.188
Imagination	14	-1.776	11.000	-0.47478	0.78	.076
Challenge	14	-2.214	7.500	-0.5917	0.85	.027*
Total	14	-2.111	8.000	-0.56409	0.84	.035*

* Significant at the 0.05 level.